

PC
MAGAZINE

**EDITORIAL
LIBRARY**

Is There Anything They
Can't Do? We Test the
Newest Generation of
DTP Software



**NETWORK
EDITION**

MAGAZINE

Remote-Office
Routers: Four Ways
To Connect to the
Central Office

Michael Miller on
The Inevitable
Demise of the 486
Machine

How Much

MEMORY

Do You Need?

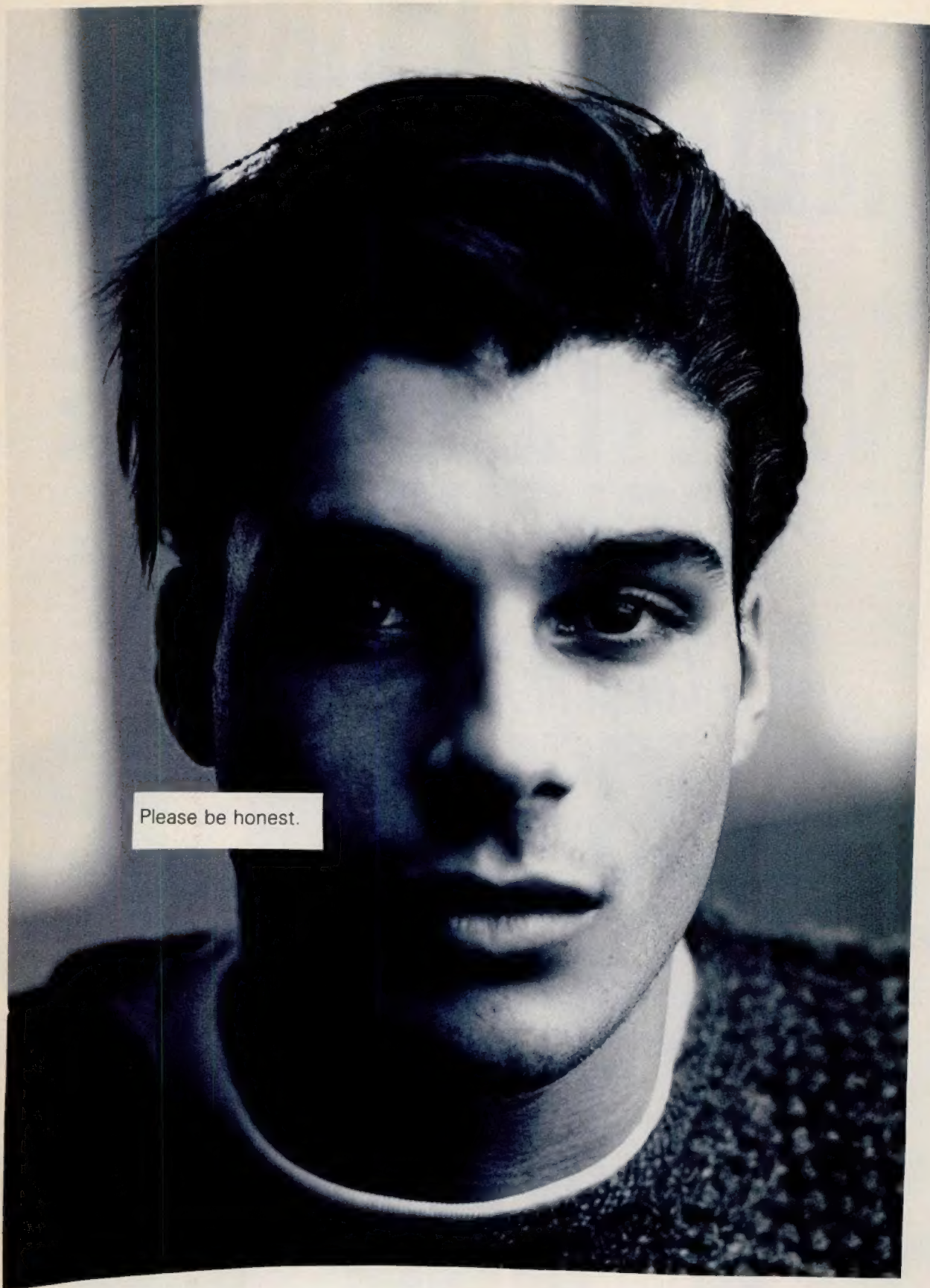
**PC Labs Finds the Right
Amount for Windows,
OS/2, and NT Users**

NETWORK
EDITION





Don't lie to me.



Please be honest.

CIRCLE 157 ON READER SERVICE CARD

**YOU'LL LIKE
NEW MICROSOFT
ACCESS 2.0
WHETHER YOU'RE
LOOKING FOR
A *database* OR A**

DATAB

Rebate offer: Licensed users of Microsoft Access and Microsoft Office 4.0 or later qualify for \$30 rebate upon acquiring Microsoft Access 2.0 (\$129 upgrade SRP). Licensed users of Office Professional, Office Standard, Word, Microsoft Excel, PowerPoint, or Microsoft Professional includes Microsoft Excel, Word, PowerPoint, Microsoft Access, and a workstation license for Mail (Mail server and software acquired separately). In the 50 United States, call (800) 370-8996, Dept. CN3. For info only: In Canada, call (800) 563-9048.

They say you can't be all things to all people. But one database comes really close: new Microsoft Access® database management system 2.0. The first relational database for everyone.



Mail Merge Wizard works directly with Microsoft Word to place your selected data into the document of your choice.

If you need a database with a small "d," you've found it. Microsoft Access is easy to use. So easy, you can create tables, make forms, and print reports right from the start.

Want that capital "D" variety?

Then fasten your seat belts.

Microsoft Access packs speed, power, and control. Helping database developers quickly create sophisticated database applications.

The fact is, Microsoft Access has something for everyone. Or more precisely, a lot for everyone.

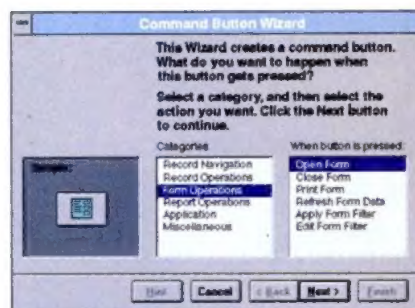
Like new Rushmore™ query optimization, a technology that makes queries lightning fast. So you get your data quicker.

Like Table Wizard, a feature that takes you step-by-step through table setup and design.

Like Query Wizard, a helpful assistant who walks you through the steps of finding your data.

In fact, thanks to IntelliSense™ technology, a Microsoft Office

event model for added control and flexibility similar to Microsoft®

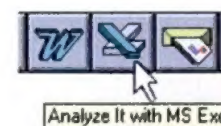


Add fully functional buttons to a form using the Button Wizard. Microsoft Access does all the work of writing the code behind the button.

Visual Basic® programming system.

Microsoft Access even makes it easy to tap into any current database you have, from Paradox® to Microsoft SQL Server.

You can also count on unlimited no-charge product support



With OfficeLinks, send data directly to Microsoft Excel using the Analyze It toolbar button.

ASE

feature, many of your routine tasks will be automatic. And your complex tasks become much easier. Of course, when you're ready to venture beyond the basics, Microsoft Access is, too. With tools that help you develop powerful database applications. Including engine-level validation guaranteed to keep your data safe.

by phone (toll charges may apply).

And for as little as \$99* for an upgrade or \$359* for the Office Professional upgrade, Microsoft Access couldn't be more, well, accessible. For a reseller's name, or to order, call 800-370-8996, Dept. CN3.



And a programming language featuring an

Microsoft Office

MONARCH. A NEW WAY TO ACCESS CORPORATE DATA.

Now PC users can get their hands on corporate data, without burdening the MIS department, or tying into the central database. Introducing Monarch™, a unique PC application that uses *existing computer reports* as a source for data. Monarch extracts data from report files downloaded from any mainframe, mini or PC. Instantly, the reports come alive on your screen, so you can look things up, boil things down, get totals and subtotals, all at electronic speed. And you can send report data to applications like dBASE and 1-2-3. Call today for your free demo disk.



1-800-445-3311

personics
A DATAWATCH COMPANY

(508) 658-0040 FAX (508) 988-0105

**CALL FOR
FREE
DEMO**

P9

CIRCLE 026 ON READER SERVICE CARD
NOW AVAILABLE AT
EGGHEAD SOFTWARE.

Inside

I remember the first time I upgraded the memory on a PC. I had a Radio Shack Model 1, and I wanted the upgrade that would take it from 4K to 16K of RAM.

“16K?” the salesman asked incredulously. “That’s more memory than you’ll

ever need.”

When I got my first IBM PC, it had 64K of RAM. I was told I could buy a card that would take it up to 256K, but “that’s more memory than you’ll ever need.”

Today, of course, even the most basic of applications requires many times that memory. Several well-known applications need 4MB, 6MB, or even 8MB of RAM to run well, and if you want to run multiple applications or handle high-end graphics, that may not be enough.

How much memory do I really need? is a question that we still hear often. So executive editor Rick Ayre and PC Labs technicians led by Dan Smith have spent months working with Microsoft Windows, OS/2, and Microsoft Windows NT trying to answer just that question. Read “How Much Memory Do You Need?” and discover the secret of having enough memory to get the most out of these environments without spending extra money on RAM that you’ll never use.

How much is enough? is also the question behind our compar-

isons of desktop publishing software and personal information managers. Once upon a time, your only choices were high-end professional publishing systems or very limited end-user systems. In “Over the [Desk]top,” we see how today’s desktop publishing packages fall more along a continuum, letting you pick the package that best fits your needs.

The “one size fits all” mentality applies even less well to PIMs, designed to help you keep track of your contacts, appointments, and free-form information. Because these are, by definition, personal products, different people use PIMs differently. The resulting Editors’ Choice discussion was quite a fractious debate.

Every year, our requirements for memory, speed, and features in our applications seem to increase. But one thing remains constant: We are all trying to find the answers that really work for us.—Michael J. Miller



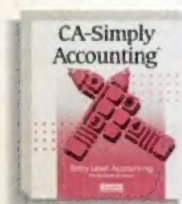
PC Magazine: The Independent Guide to Personal Computing, ISSN 0888-8507, is published biweekly except in July and August for \$44.97 for one year. Ziff-Davis Publishing Company, L.P., One Park Ave., New York, NY 10016-5902. Second-class postage paid at New York, NY 10016-5902 and at additional mailing offices. POSTMASTER: Address changes to PC Magazine, P.O. Box 54093, Boulder, CO 80322-4093. GST Registration Number: R-1236689673. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 266477.



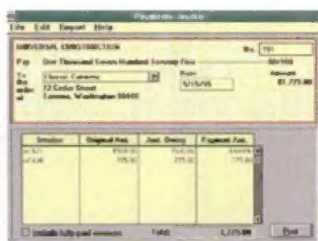
Small Business Genius Reveals Accounting Secret.

Easy To Learn, Easy To Use,
Easy To Afford.

When it comes to accounting software, this is



Easy Street. It's the friendliest, easiest, most powerful small business accounting software ever developed. With simple instructions, terrific tutorials and friendly, colorful menus, you'll be up and running in minutes. Just click the



mouse to write a check, process a bill, prepare an invoice or do your entire payroll. And it has all the accounting modules your small business needs: General Ledger, Accounts Payable and Receivable,

Job Costing, Payroll and even Inventory Control. They're all completely integrated and let you generate all kinds of great-looking reports with the push of a button.

It's everything you need so you can spend less time on accounting and more time building your business.

See Your Local Dealer Or Call
1-800-225-5224, Dept. 33007.

For under \$89, even the price is easy too. So call today — and make it easy on yourself.

COMPUTER ASSOCIATES
Software superior by design.

CA-Simply AccountingTM

© Computer Associates International, Inc., One Computer Associates Plaza, Islandia, NY 11786-7000. All product names referenced herein are trademarks of their respective companies. Now available for Windows, OS/2, DOS and Mac.

THE #1 WINDOWS DATABASE



Why Paradox is the #1 PC database for the entire corporation

From marketing to R & D, from finance to sales, and from the executive suite to

the warehouse . . . more users get more productivity out of Paradox® than any other PC database. It has become the #1 choice for a corporate standard because it works for

people at every skill level, to accomplish any task with speed, flexibility and ease of use.

Upsize to client/server with instant SQL connectivity

Paradox provides immediate connections to popular SQL servers like Borland InterBase®, Sybase/MS®, and Oracle, easily allowing you to "upsized" your PC and PC network applications to a more secure, higher performance client/server environ-

ment. So no matter how much your information grows, you'll never outgrow Paradox.

Paradox is the best Windows database

	Paradox	Access
Visual data modeling for forms and reports	Yes	No
Object-oriented development environment	Yes	No
Supports SQL pass-through	Yes	No
Built-in workgroup support	Yes	No
Complete Paradox and dBASE file support	Yes	No

Total information access

Paradox for Windows gives you the easiest transition to the Windows environment. You get seam-

less access to all the most popular database formats—Paradox for DOS, dBASE®, and even FoxPro. You can use all the data available, even on a network combining DOS and Windows users. And with graphical Query By Example, getting just the information you want is quick and easy.

So whether you're keeping track of customer mailings, or managing vast worldwide inventories, Paradox makes it easier to access, manage, and present

information for users at every level, on every project.

Discover the database that has corporations everywhere on the grow. Get Paradox for Windows today.



Paradox for Windows
May 11, 1993



Paradox for Windows
November 1993



Paradox for Windows
February 1994

90-day, money-back guarantee!

**See your dealer or call now,
1-800-336-6464, ext. 8628**

In Canada, call 1-800-461-3327.

Borland
Power made easy™

*Visit your nearest "Borland Means Business" retailer to complete an entry form to win a 486. Exclusively in the United States. Copyright © 1994 Borland International, Inc. All rights reserved. All Borland product names are trademarks of Borland International, Inc. BI 6955

CIRCLE 285 ON READER SERVICE CARD

UP FRONT

Inside

Memory: What's enough? ...4

Letters

Readers Speak Out on On-Line Services19

Trends

- The Chicago PC
- New ideas in pointing devices
- Demand for DSP chips is increasing
- Pipeline: Interactive TV hysteria29

**First Looks**

- CrossTies for Windows
- ImagePals 2
- NEC MultiSync 4PG Multimedia Monitor
- CoSession for Windows ..37

New & Improved

BY ADAM A. HICKS61

Read Only

EDITED BY TIN ALBANO73

COLUMNISTS

Michael J. Miller

486: A Final Requiem79

Bill Machrone

Pigs, Ducks, and RSI87

John C. DvorakPCMCIA Blues.....93
Inside Track95**Jim Seymour**

What's Wrong with CD-ROMs99

Bill Howard

Are You Ready to Reap What Intel Sows?.....107

COVER STORY

System Memory

How Much Memory Do You Need?

BY RICK AYRE You know that you need more memory to run Windows, OS/2, and Windows NT than you ever did to run DOS. And you even know that some applications need more memory than others. But you still don't know what the optimum amount is. PC Magazine Labs runs tests with operating systems and applications to find out where the memory "sweet spots" are.....115

Microsoft Windows 3.1	116
IBM OS/2.1	132
IBM OS/2 for Windows	132
Microsoft Windows NT 3.1	134
Highlights	116
Performance Tests	117

Hardware

Roll Your Own CD

BY LEON ERLANGER CD-ROM publishing no longer requires paying thousands of dollars to a mastering and replication plant for a minimum order of 1,000 disks. Desktop CD-recorders are available now for as little as \$3,899 including software, and CD-R disks sell for under \$20. PC Magazine Labs tested eight CD-R pre-mastering kits and found that you can roll your own CDs—if you're willing to put up with difficult installations and moderately buggy software137



<i>CD-Gen for DOS</i>	146
<i>JVC's Personal RomMaker</i>	146
<i>Personal Scribe 500 P</i>	148
<i>Pinnacle RCD-202</i>	150
<i>PlayWrite 1000</i>	155
<i>QuickTOPIX/Windows</i>	160
<i>Simpli-CD</i>	161
<i>WinOnCD</i>	162

Highlights.....	138
Editors' Choice.....	139
Suitability to Task.....	140
How We Tested.....	145
Montage: Indexing for Fast Access.....	148
Yamaha's Quad-Speed CDE100.....	150
Write-Once Archiving with CD-R.....	155
Summary of Features.....	156

Desktop Publishing

Over the [Desk] Top

BY LANCE ULANOFF It's no longer sufficient to say you need either a professional- or entry-level desktop publishing package. Not all professionals require lots of design-intensive tools, and some novices may need programs that can do more than create black-and-white flyers. The current crop of desktop publishing products is more varied than ever. We review nine professional- and entry-level packages that cover the spectrum164

Professional Desktop Publishing	167
<i>Corel Ventura</i>	177
<i>FrameMaker for Windows</i>	181
<i>PageMaker for Windows</i>	182
<i>QuarkXPress for Windows</i>	186
Entry-Level Desktop Publishing	190
<i>CompuWorks Publisher for Windows</i>	197
<i>Microsoft Publisher</i>	199
<i>PagePlus for Windows</i>	200
<i>PFS:Publisher</i>	202
<i>Publish It! for Windows</i>	204

Editors' Choice.....	166
Highlights.....	170
A DTP Continuum.....	175
How We Tested.....	176
Suitability to Task:	
Professional-Level Desktop Publishing Software.....	178
...And Then There's Interleaf.....	184
A Group Publishing Effort.....	186
Illustration Software for Desktop Publishing.....	188
Suitability to Task:	
Entry-Level Desktop Publishing Software.....	190
Summary of Features.....	194

Software

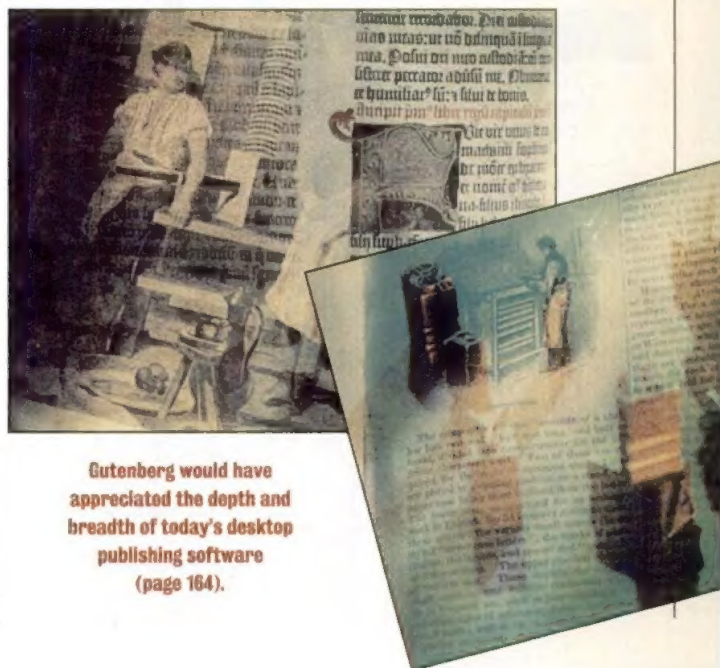
P Is for Personal

BY HILLARY RETTIG

It's a personal thing: The PIM you choose must match your style and work habits, and slip into your life with ease. You'll find tools not only for handling appointments, contacts, and tasks, but also for managing random information and customizing your work. There's something for everyone209



<i>Arcadia Workplace Companion</i>	216
<i>Ascend</i>	218
<i>Commence</i>	222
<i>Computer Organizer for Windows</i>	227
<i>DeskTop Set for Windows</i>	228
<i>ECCO Professional</i>	230
<i>Instant Recall for Windows</i>	231
<i>Lotus Organizer</i>	236
<i>Merlin</i>	239
<i>On Schedule for Windows</i>	241
<i>PackRat</i>	242
<i>Sharkware</i>	252
<i>Time Planner Deluxe</i>	256
<i>Winfo Pro</i>	257
Highlights.....	210
Editors' Choice.....	211
Suitability to Task.....	212
Contact Managers as PIMs.....	220
Summary of Features.....	238
A Parade of PIMs:	
New in '94.....	251



Gutenberg would have appreciated the depth and breadth of today's desktop publishing software (page 164).

NETWORK EDITION

Follows page 258

Phoning Home: Linking Remote Offices to the Central LAN

BY STAN SCHATT

Who has the right remote-office router for the job?NE1

First Looks

ZDS Z-StorNE13

Lattis System 5000NE13
Nokia PC CardNE22
Timbuktu for WindowsNE24

New & Improved

Meeting Maker XPNE35
CatalystNE35
Cisco 7010NE35
SwitchBalanceNE36
EtherChannelNE35
IntellecteNE36

StarWorksNE36
Saber Enterprise Application ManagerNE36

Learn 100 Simulations

The Internet: Today's Information Highway?NE41

Derfler & Greenfield

Riding a Development WaveNE43

PC TECH

User-to-User

BY NEIL J. RUBENKING

PC MAGNET Using MEM and FIND in a batch file to determine whether a specified TSR is loaded in memory209

Tutor

BY JEFF PROSISE

Windows Multitasking261

Toolkits

BY RICK KNOBLAUGH

Hide Programs with Cloaking269

Environments

BY CHARLES PETZOLD

PC MAGNET The Windows NT Matrix Transform271

Power Programming

BY MARK FLORENCE

PC MAGNET Bring Programs to Life with Digital Video283

Utilities

BY NEIL J. RUBENKING

Protect Your .INI Files with INIBAK293

PC SOLUTIONS

Hardware

Which video adapters are best for DOS graphics applications; upgrading an older PC versus buying a new one299

Operating Environments

How to enjoy wave file sounds without disrupting the network; why DoubleSpace may not actually double your disk capacity302

Word Processing

Replacing Sysedit with a more feature-rich editor303

Spreadsheets

Referencing a cell whose position changes when the worksheet changes; finding the *n* most frequent numbers in a range305

Databases

PC MAGNET A FoxPro program that uses the text-merge feature to generate source code that re-creates a .CDX file312

AFTER WORDS

After Hours

- **Screen Savers:** Giving Your PC Some Panache
- **CD-ROM Pick Hit:** The Family Doctor, 3rd Edition
- **Utilities:** Feature Presentations: Flight
- **Simulations:** SimCity 2000
- **Arcade Games:** Nyet III, Oxyd Magnum416

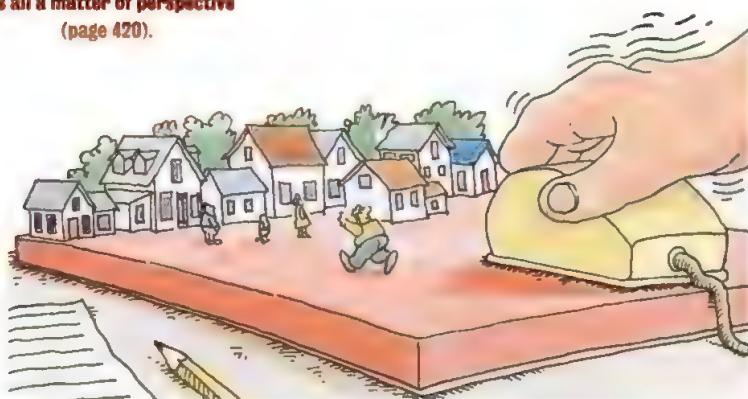
Abort, Retry, Fail?

BY DON WILLMOTT420

ALSO IN THIS ISSUE

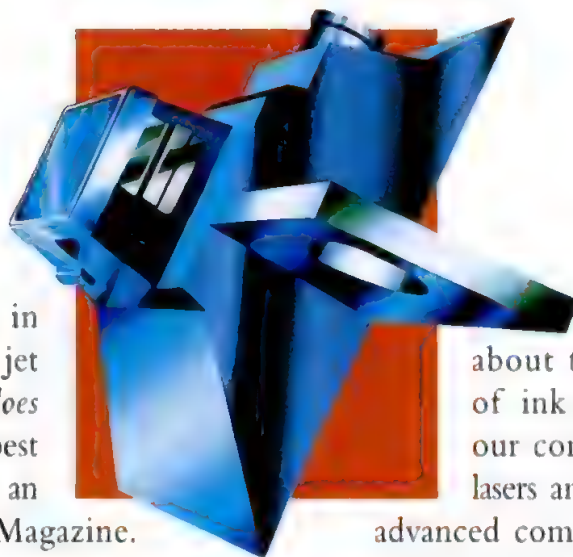
Direct Marketing Connection	303
Marketplace	309
Premier	369
Classified	384
Business Cards	397
Reader Service Card	403
Index to Advertisers	411
Advertisers' Product Index	412
Coming Up	414
Editorial Product Index	415

It's all a matter of perspective
(page 420).



**\$25
REBATE****

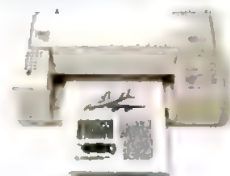
THE REVOLUTIONARY TECHNOLOGY IN THE EPSON STYLUS™ 800 INK JET LOOKS BEST WHERE IT COUNTS MOST.



The advanced technology in the EPSON Stylus 800 ink jet looks great. But what it *does* looks even better. "...the best text output we've seen from an ink jet printer," says PC Magazine. "The EPSON Stylus 800 has a new technology that yielded higher-quality text output than any other comparably priced ink jets."* No other personal ink jet has EPSON Stylus technology, so no other personal ink jet produces images as clear and crisp as the EPSON Stylus 800.

*EPSON'S
Piezo-powered
technology, featuring
our exclusive Multi-
Layer Actuator Head,
produces the finest
output ever seen from
a personal ink jet*

For more information about the EPSON Stylus line of ink jet printers, or about our complete line of scanners, lasers and other technologically advanced computer products, call the EPSON Connection at 1-800-BUY-EPSON (1-800-289-3776). Or visit your local store and ask to see the EPSON Stylus 800 ink jet. It's the one that looks best where it counts most.



EPSON Stylus 800

****HOW TO GET YOUR REBATE:** 1) Buy an EPSON Stylus 800 between February 26, 1994 and May 31, 1994. 2) For participating dealers, rebate details and form, call the EPSON Connection, 1-800-BUY-EPSON. 3) Send rebate form, product serial number and copy of receipt to EPSON to receive \$25 rebate.



*PC Magazine November 1993. The Energy Star™ emblem does not represent EPA endorsement of any product or service. EPSON is a registered trademark of SEIKO EPSON CORP. © 1994 EPSON AMERICA, INC., 31770 Madrona Ave., Torrance, CA 90503. For dealer referral or warranty details, call 800-BUY-EPSON (800-289-3776). In Canada, call 800-GO-EPSON. For Latin America, 305-265-4092.



ON PAPER.

Now \$25 Rebate!

EPSON



Editor-in-Chief Michael J. Miller

Editor Robin Raskin

Executive Editors Rick Ayre, Bill Howard

Director, PC Labs C. James Galley III Art Director David Herbick

Senior Networking Editor Frank J. Derfler, Jr.

Senior Editors Christopher Barr (West Coast), David Greenfield (Networking and Communications), Dale Lewallen (Technical Columns), Don Willmott (First Looks)

Managing Editor Paul B. Ross Assistant Managing Editor Dianne H. McDonald

Senior Associate Editor Brian Nadel (PCs) Associate Editors Gayle C. Ehrenman (After Hours), Leon Erlanger (Hardware), Carol Levin (Trends), Thomas Mace (Applications Development), Gail Shaffer (Networking and Communications), Ted Stevenson (Software), Sharon Terdeman (Technical Columns), Lance N. Ulanoff (Graphics) Technical Editor Neil J. Rubenking Senior Production Editors Shari L. Girouard, Kim Schueler Copy Chief Glen Boisseau Becker Staff Editors Tin Albano, Jamie M. Bsales, Kathleen Caster, John Clyman, Vicki B. Jacobson, Andrew C. Kantor, Ellyn J. McCasland, John Moore, Michael W. Muchmore, Michael Ryan, Craig L. Stark, Carol A. Venezia, Anush Yegyzarian Senior Writer Robert S. Anthony Staff Writer William P. Flanagan Assistant Editor Adam A. Hicks Senior Copy Editor Jeanne Albrecht Copy Editors Elisabeth H. Holzer, Jill Léger, Joseph N. Levine, Ann Ovodow, Michele Pepe, Asa Somers Assistant Copy Editors Jay Amster, Elliot Thomas Grant Layout Manager Linda Harms Assistant Layout Manager Shelly Fierston Senior Layout Editors Thomas DeVito, Lillian Gaffney Librarian Thomas W. Giebel Library Assistant Dolores Williams Editorial Researchers Mary E. Behr, Eryn R. Brown, Angela Hickman, Brendon M. Macaraeg, Todd Spangler, Brad Stilwell, Jodi L. Wynblatt Editorial Assistant Melissa J. Perenson System Support Manager Craig Ellison PC Support Analyst Melvin Acevedo Production System Support Manager Patricia Perkowski Communications Manager Diana Garelik Assistant to the Editor-in-Chief Tara Solon Assistant to the Editor Rita Aprahamian Assistant to the Executive Editors Christina M. Evelyn Administrative Assistant Christina Okang Support Associate, PC MagNet Louise Laberge Sysop, PC MagNet Ken Hipple

Contributing Editors Bill Machrone (Publishing Director), Douglas Boling, Bruce Brown, Sheryl Canter, Ray Duncan, John C. Dvorak, Lori Grunin, Mitt Jones, Nick Lippis, Michael J. Mefford, Edward Mendelson, Charles Petzold, Alfred Poor, Jeff Prossie, John R. Quain, Sal Ricciardi, Winn L. Rosch, Joe Salemi, Jim Seymour, Richard Hale Shaw, Barry Simon, Luisa Simone, Craig Stinson, M. David Stone

Associate Art Directors Lisa A. Sergi, Charles Conover, Curtis M. Fields, Donna Panagakos Assistant Art Director Robin L. Malik-Gomes Associate Graphics Director David Foster Graphic Artist Josef Pusedu Assistant to the Art Director Frieda T. Smallwood Contributing Photographer Thom O'Connor

Technical Directors Ben Z. Gottesman (Software), Nick Stam (Hardware) Testing Coordinator Steve Buehler Project Leaders Jeffrey D. Baher (Network First Looks), Amarendra Singh (Software), Robert P. Lipschutz (Networking and Communications), Jeff Mace (Graphics), Jay Munro (Applications Development), Tami D. Peterson (PCs), Michael J. Zulich (Hardware) Programmers Richard V. Dragan, Kenchai Prakobchart Product Testing Manager Charles Rodriguez Technical Analysts Daniel A. Begun, Laura Cox, Richard Fisco, John Garris, Margaret A. Piemonte, Dan Smith, O. Ryan Tabibian Support Technicians Peter Bastide, Marino Delzotto, Bruce Kowalski, Deval Shah, Denis Tom Operations Manager John R. Delaney Inventory Control Coordinators Rob Graydon, William Pagan, Mark Randall Administrative Assistant Olga Morillo

Publisher Jim Stafford

Associate Publishers Anna Zornosa (West Coast), Lon Otremba (East Coast), Daniel Rosensweig, Michael Perkowski (Marketing), Michael Wiener (Networking) National Sales Manager Bill Stephen Sales Development Manager Susan Federspiel Client Services Managers Steve Robinson (Systems), John Wisdom (Advertising) Research Director Michael Van Engen Assistant Research Manager Scott Gibson Promotion Manager Lisa DiBenedetto Events Manager Dawn Gudelis

Senior Advertising Production Manager Lori Iaccino Advertising Production Manager Pamela Berkowitz Assistant Advertising Production Managers Susan Conrad, Robert Joy Coordinator, Edit Production Mark Baard

Advertising Offices: One Park Ave., New York, NY 10016-5802; 800 33 MAG AD, 212-503-5100

**Ziff-Davis Publishing Company
Chairman and CEO Eric Hippeau
President J. Scott Briggs**

**President, Ziff-Davis Domestic Publications Group Ronni Sonnenberg
Executive Vice President, Centralized Operations Group Mike Edelhart
Executive Vice President, International J.B. Holston III
Group Vice President, Controlled Circulation Publications Claude P. Sheer
Group Vice President, Paid Circulation Publications Jeff Ballowe
Senior Vice President, Circulation Baird Davis
Senior Vice President, Marketing Paul H. Chook
Senior Vice President Rachel Greenfield**

Vice Presidents Bob Bader (Central Advertising Sales), James F. Ramaley (Circulation Services), Howard D. Szkolnik (Controller), Herbert Stern (Creative Services), Frank Kelcz (Europe), Rayna Brown (Human Resources), Ann Pollak Adelman (Marketing Services), Robert Ziff (New Projects and Strategic Planning), Dirk Ziff (Operations), Roger Herrmann (Production), Rolf Wulfsberg (Research), Bill Machrone (Technology) Vice President/Managing Director Magazine Networks Joseph Gillespie Vice President, Assistant to the Chairman Tom McGrade Vice Presidents Jim Stafford, Don Byrnes Chief Information Officer Wellington Y. Chiu General Manager Bruce Bourne Executive Director, Information Systems Owen Weekley Executive Director, Marketing Services Jim Manning Directors Jean Lamensdorf (Licensing), Gary A. Gustafson (Planning), Walter J. Terlecki (Production), Susan Delman (Corporate Marketing), Lewis D'Vorkin (Editorial), Bill Catchings (Codirector ZD Benchmark Operation), Mark L. Van Name (Codirector ZD Benchmark Operation), Alicia Marie Ivans (Direct Marketing Programs), Gregory M. Jarboe (Public Relations)

**Ziff Communications Company
Chairman Emeritus William B. Ziff, Jr.
Chairman and CEO Eric Hippeau
Senior Vice President and Chief Financial Officer Bruce Barnes
Senior Vice President Steven C. Feinman
Vice President, General Counsel, and Secretary J. Malcolm Morris
Vice President, Business Manager T.L. Thompson
Vice President, Chief Information Officer Thor Olson
Controller and Treasurer Timothy J. Mitchell**

Subscription Inquiries, Address Changes

Subscription Services: For subscription service questions, address changes, or ordering information, call toll-free 800-289-0429 in the U.S. and Canada; all other countries, please contact Ireland: 353-61411466 or fax 353-61419457. Or write to *PC Magazine*, P.O. Box 54093, Boulder, CO 80322-4093.

Subscription Rate: The subscription rate is \$44.97 for a one-year subscription (22 issues). Canada and all other countries, please add \$36.00 for postage.

Back Issues: For back issues (subject to availability), \$8 per issue (\$9 outside the U.S.), send check or money order to Back Issues Dept., Ziff-Davis Publishing Company, P.O. Box 53131, Boulder, CO 80322-3131

Computer Select: *PC Magazine* is available on Computer Select, a CD-ROM published by Computer Library. For subscription information, call Computer Library at 800-827-7889, ext. 708.

How to Contact the Editors

We welcome letters. However, we cannot look up stories from past issues, recommend products, or diagnose problems with your PC by phone. Send your written questions, complaints, and compliments to *PC Magazine*, One Park Ave., New York, NY 10016-5802. Please include a daytime telephone number. Send electronic mail to MCI Mailbox 157-9301, to CompuServe address 72241,104, Internet address 157.9301@mcimail.com, or to PC MagNet (see below). *PC Magazine's* general number is 212-503-5255. The West Coast Operations number is 415-378-5500.

If you are dissatisfied with a product advertised in *PC Magazine* and cannot resolve the problem with the vendor, write (do not call) Jennifer Roth, Advertising Department, at the above address. Include copies of your correspondence with the vendor.

PC Magazine does not accept unsolicited manuscripts. We will pay \$50 for Solutions and Programming user tips and for Abort, Retry, Fail? submissions. If you submit artwork or newspaper clippings with Abort, Retry, Fail?, mark up the photocopy, not the original.

PC MagNet

PC Magazine operates PC MagNet, an on-line service of ZiffNet, hosted by CompuServe. To join, set your communications software for 7 data bits, even parity, 1 stop bit, and full duplex. To find the number nearest you, dial 800-346-3247. (In Canada, dial 800-635-6225, voice only.) At the Host Name prompt, enter PHONES. Follow the menus, note the number closest to you, then hang up and dial the number. At the HOST NAME prompt, enter CIS. At the USER ID prompt, enter 177000,5000. Enter PC*MAGNET at the PASSWORD prompt and PCMAG94 at the ENTER AGREEMENT NUMBER prompt. CompuServe members may join by typing GO PCMAG at any CIS ! prompt. ZiffNet membership is \$2.95 a month, which includes access to *PC Magazine* Editors' Choice awards, Product Reviews Index, Newsbytes, ZiffNet Highlights and Information, and the Support Forum. Connect-time charges vary according to modem speed.



To obtain this issue's utility free of charge: Dial 617-231-4450, with your modem, to access the *PC Magazine* Utilities BBS. Enter your name at the prompt, and follow the menus.

Prodigy members can download *PC Magazine* utilities from ZiffNet Selections on Prodigy for a transfer fee of \$3 per program. Jump 'ziff select' and browse the computing topics for programs.

Permissions, Reprints

Material in this publication may not be reproduced in any form without permission. If you want to quote from an article or use *PC Magazine's* logo in conjunction with an Editors' Choice designation, write Chantal Lavelanet; for information on reprints in quantities of 500 or more, write Carol Peters.

PC Magazine Reviews

Except where noted: All *PC Magazine* reviews are of currently available products. Benchmark and performance tests are run on Compaq Deskpro 486/33M's.

Editorial and Business Office: One Park Ave., New York, NY 10016-5802. Editorial: 212-503-5255; Advertising: 800 33 MAG AD, 212-503-5100. *PC Magazine* is an independent journal, not affiliated in any way with International Business Machines Corp. IBM is a registered trademark of International Business Machines Corp. Entire contents copyright ©1994 Ziff-Davis Publishing Company, L.P. All rights reserved; reproduction in whole or in part without permission is prohibited. The following are registered trademarks of Ziff-Davis Publishing Company, L.P.: *PC*, *PC Magazine*, *PC Labs*, *PC MagNet*, *PC Magazine Award for Technical Excellence*, *PC Magazine Editors' Choice Award*. The following are trademarks of Ziff Publishing Company, L.P.: Abort, Retry, Fail?; Direct Marketing Connection; First Looks; Lab Notes; New and Improved; *PC Marketplace*; *PC Solutions*; *PC Tech*; Pipeline; Power Programming; Read Only; Trends; Tutor; User-to-User; Utilities; The Working Word.

HOT NEWS!
New features...
...at a special price...

Corel Ventura

The Best in Publishing

Professional publishing power with Corel ease of use

* Ventura Version 3.0 for OS/2

Add flair to your documents with a choice of over 600 TrueType and Type 1 fonts.

Choose from over 10,000 EPS clipart images and 100 high-res color photos included with Corel Ventura, or import graphics from a variety of popular software packages.

Create professional DTP documents by controlling every aspect of your page layout including page size and orientation, paragraph and frame attributes, and high-end typography settings.

Automatically generate tables to highlight key information.

Rotate text for creative headings.

Anchor graphic frames to text to maintain referencing between text and graphics.

What's Cooking? in Marketing

The following article was prepared by a member author of "What's Cooking?" and belongs to the information bank of the Society of House Publishers Publishing.

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

Three Peppers News by Mary Beth Smith

The single solution for projects of any size or length, Corel Ventura 4.2 for Windows features faster font loading and complete color prepress capabilities. There is support for Adobe™ Acrobat™ and a bonus Adobe Acrobat Reader.™ You'll receive Ventura DataBase Publisher 4.2,

that lets you publish documents from database information, Ventura Separator and Ventura Scan. Plus, there are 75 templates, over 600 fonts and more than 10,000 clipart images that let you easily create a wide range of dynamic communication materials.

Value!

- Two fully-featured publishing applications
- 75 professionally-designed templates
- Direct scanning, prepress control and color separation utilities
- Over 10,000 EPS clipart images
- Over 600 TrueType and Type 1 fonts
- 100 high-resolution royalty free photos
- Over 25 import filters
- Adobe Acrobat Reader with Adobe Type Manager® 2.6 included

Automation!

- Automatic generation of indexes and tables of contents
- Easily create page headers and footers
- Automatic pages, chapter and figure numbering
- One-step bullets and drop caps
- Automatic file links for direct updates
- Automatic text-reflow
- Create Hypertext links with new Adobe Acrobat support

Versatility!

- Create documents of any size, length or complexity
- Import text and graphics from a variety of software packages
- Create data-intensive documents such as catalogs and price lists quickly and easily



\$137.95

CD only
\$169.95 with CD and disks

PC Connection®

1-800-800-4656

CIRCLE 322 ON READER SERVICE CARD

COREL®
1-613-728-3733
Ext. 20

KUR-0049

Thompson & Associates

December 10, 1993

Mike Sawyer
Thompson & Associates
1175 Washington Street
Atlantic City, NJ 08403

Dear Mr. Sawyer:

It was a pleasure meeting you at our weekly visit of 11 December 1993. The following is a quick overview of the issues discussed and our preliminary findings.



As you can see by our initial evaluation, the overall financial performance of your organization continues to be strong. We believe you have positioned yourself well for continued growth in the marketplace. However, we will review the information you have provided and make some recommendations regarding the business system. Overall, your product mix appears to be focused primarily on Private products, but the greatest source of growth appears to be coming in the Budget line.

You can expect to see our detailed report on 17 January 1994. We will work to provide you with key notes to continue your success and target the future marketplace.

Have a very happy holiday season! I look forward to seeing you in the New Year.

Sincerely,

Mike Thompson
President

610.332.36 Adam, NJ 07705 (908) 535-7467 Fax: (908) 535-7468

Mike, Eaton Town, NJ



Kusak Enterprises, Inc.

1700 Carroll Way, Seattle, WA 98101

Paul Carter
President
Kusak Enterprises
1700 Carroll Way
Seattle, WA 98101

December 10, 1993

Dear Paul,

Thank you for allowing our recent seminar to our area. I have enclosed the following information for discussion:

- A synopsis of the seminar and presentation
- A brochure detailing our background and publications

I would like you to share this information and have any one who she could not attend at Paul's High School's Computer Institute. In many cases the Tele-Work Automated System is available in supporting at JDS.

Category	Item	Value
Teachers	✓	
Students	✓	
Administrators	✓	
Volunteers	✓	
Business	✓	

Building into central support for the type of system is essential before passing information or knowledge. It is important to explore teachers and students to the JDS in the early stages of your evaluation to ensure the application of the system. I would like to provide more total information to our school for you, information, materials, PTA, parents and any local businesses interested in supporting at JDS.

Thank you again for our interest and participation in our seminar. If you have any questions or comments, please feel free to contact me at 206-767-0010. I look forward to working together to bring the JDS to the forefront of the community.

Sincerely,

Lisa

Lisa, New York, NY



All we ga was 30 minutes. first docume



Memo

To: Mike Tyson
From: Sharon
Date: December 10, 1993
Regarding: I'm going to vacation!

After working my fingers to the bone, I'm proud to announce that I'm taking a long vacation. I'll be spending five relaxing days at the Blue Bird Inn in Sandberg.

• December 24 - 28

I've assigned the following people to cover my absence:

Assignment	Covering for me
Administrative Support	Sharon Decker
Administrative Support	Don M. Carlson
Administrative Support	Sharon Decker
Administrative Support	Sharon Decker
Administrative Support	Sharon Decker
Administrative Support	Sharon Decker
Administrative Support	Sharon Decker
Administrative Support	Sharon Decker

Thank!

See you all soon.
Sharon...

Sharon, Poway, CA



ECONEWS

Organization Summary

James Carlson founded ECONEWS in 1991 upon returning to the environmental movement. Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please



James Carlson and Air Management. ECONEWS was a national organization that was founded in 1991 upon returning to the environmental movement. Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Management Summary

Management Summary of individuals who have a long 3 years of field experience as local leaders. Management levels include some leaders, field experience, and others manage.

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please

Individuals in these areas are responsible for conducting environmental management analyses and planning or redesigning conservation projects in their federal positions. Please



Dan, Buffalo, NY



**WordPerfect® 6.0 for
Windows™. Text, data
and graphics in one
easy-to-use program.**



Visual communication. It makes documents much more effective. But it doesn't have to make them harder to create.

WordPerfect 6.0 for Windows is the ideal environment for creating professional-looking documents. It starts with a foundation of great text-editing tools. Then it adds easy-to-use spreadsheet, charting and drawing functions. And it can import more types of files, even databases, than ordinary word processors. Making it the place you'll want to work.

Plus, it's only one program. So learning is easy. Coaches will teach you. ExpressDocs™ templates will design for



ve them
And the world's
nt processor.



you. Its customizable interface can easily change for the way you work best. And if you're moving from WordPerfect for DOS, the Transition Advisor makes it simple. What else would you expect from *PC/Computing's MVP?*

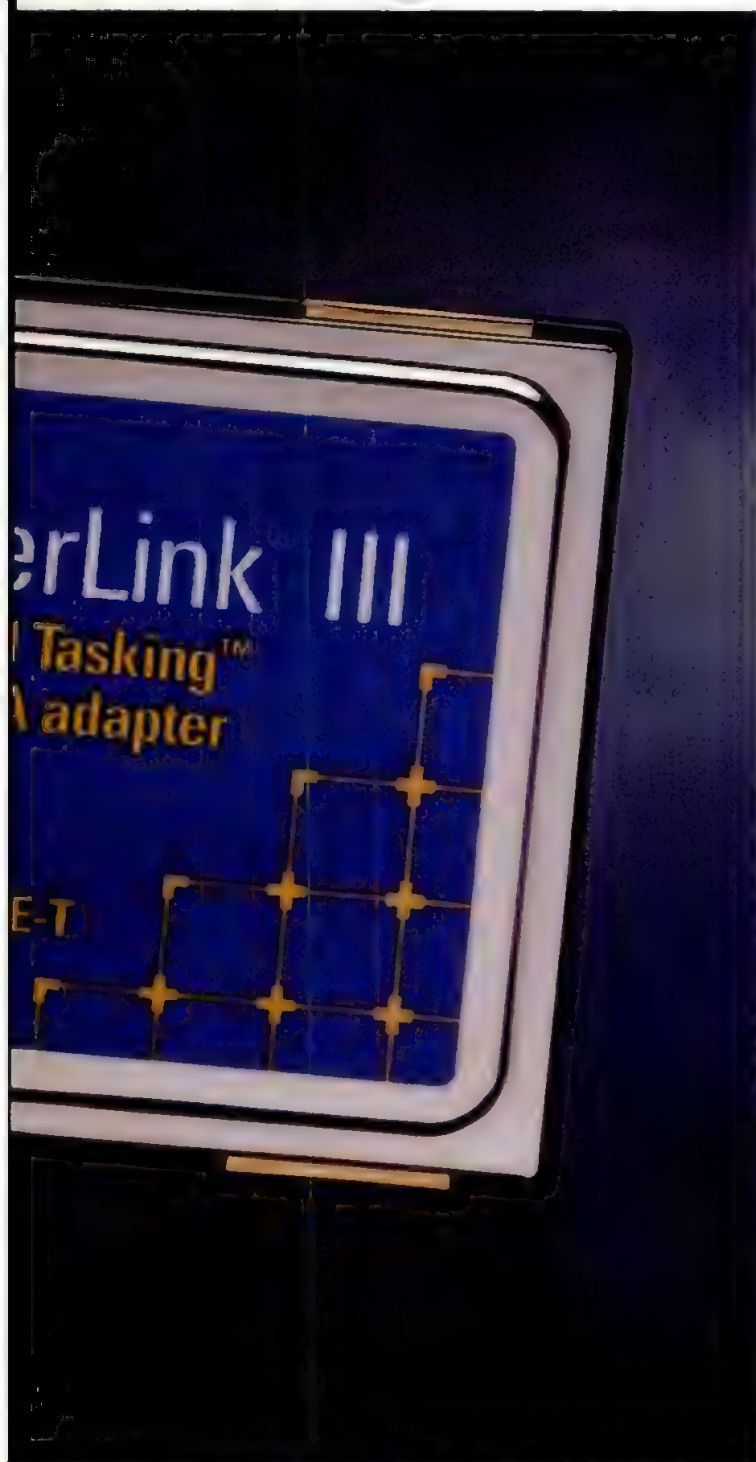
So visit your local reseller, or to order directly, call us at (800) 526-2310. And start processing more than words. Start processing documents.

WordPerfect®
6.0 FOR WINDOWS™

There's fast. A there's Parallel Ta



nd then sking™ fast.



■ It doesn't get any smaller than this. Or any faster.

The new EtherLink® III PCMCIA adapter from 3Com is 45 to 110 percent faster than any other notebook adapter you can buy, according to the latest benchmark study by LANQuest Labs.*

Built with the same Parallel Tasking technology that more than three million users have already adopted, the new PCMCIA adapter is compatible with the leading notebook computers. Guaranteed. Or your money back.

But it doesn't stop there. 3Com's EtherLink III is not only fast. It's easy to use.

The EtherLink III PCMCIA adapter can be installed in one easy step – in under three minutes. Make a single menu selection, and 3Com's AutoLink™ software completes the installation, configures the drivers and even downloads NetWare® client files from the server.

And like all 3Com® EtherLink III adapters, the new EtherLink III PCMCIA comes with a lifetime warranty.

What are you waiting for? For as little as \$99* you can try it for yourself. There's no faster or easier way to get your notebook computers networking at top speed. To order your evaluation card or get more information, call 1-800-NET-3Com.



Networks That Go the Distance™

CIRCLE 376 ON READER SERVICE CARD

*1 unit one per customer, while quantities last. TP version 5/91. Combo version 5/12/91.

Wilson just sent six e-mails.

Faxed three purchase orders.

Filed a detailed call report.

Monitored today's receivables.

And ran two credit checks.

He should show up late for flights more often.



With Bell Atlantic® AirBridgeSM Data Services, you can use your office computers through your cellular phone. AirBridge gives you a reliable, affordable wireless link that makes it easy to send or receive data. It lets you fax, use e-mail, and access virtually any database from anywhere AirBridge service is available. Call



1-800-255-BELL. We'll tell you more about how AirBridge lets you take your office with you wherever you go.



Bell Atlantic Mobile

Service available in all or portions of the Bell Atlantic Mobile markets: Arizona, Connecticut, Delaware, Maryland, Massachusetts, New Mexico, New Jersey, Pennsylvania, Rhode Island, South Carolina, Texas, Virginia, Washington DC, and West Virginia.

CIRCLE 342 ON READER SERVICE CARD

Letters

COMMITMENT TO AN ON-LINE PRESENCE

In your March 15, 1994, evaluation of America Online ("Making On-Line Services Work for You"), the author stated that the on-line version of our magazine, *The Atlantic Monthly*, was "gutted of the long, in-depth features it is known for." Although we decided not to include several longer articles when we first launched the service last November, we now stock our AOL area with every article in the magazine except those that we do not have copyright permission to upload. The Atlantic Monthly Online actually contains more material than the magazine itself, because each month we include sidebars and other timely features on-line that appear nowhere else.

As for the author's general criticism that "some publications don't update their on-line areas, some editors don't appear on-line very often, and some 'full text' is not really full," we should explain that we upload our material—always unabridged—the day the magazine hits the newsstands and that half a dozen editors regularly participate in message-board discussions.

Cullen Murphy
Managing Editor
The Atlantic Monthly
Boston, Massachusetts

JUST LOOK AT YOUR COMPASS

I was very disappointed to see that our OS/2 CompuServe navigation program, Golden CommPass, wasn't included in your review of "front ends" for the CompuServe Information Service ("On the Front Lines," March 15, 1994). The omission of Golden CommPass, the only OS/2 CompuServe front end, only furthers the argument that *PC Magazine* is biased against OS/2 and OS/2 applications.

Larry B. Finkelstein
President

Creative Systems Programming Corp.
Mount Laurel, New Jersey

You may have tried "more than 20 front ends for CompuServe," but how could you miss Golden CommPass? When it comes down to sheer navigational ease



On-line services have passionate supporters ... and detractors.

and power, nothing beats it.

Golden CommPass is capable of intelligent subject-based thread making, reading messages as soon as forum processing is completed, and creating library catalogs. Its user-friendly features are too numerous to list here. The program also offers one of the best examples of OS/2's multithreading powers.

Doug Boze
via PC MagNet

WHERE'S DELPHI?

Kudos for your on-time analysis of on-line services, but I was disappointed to see that you mentioned Delphi only briefly. The other on-line services have dragged their feet on providing the range of Internet access Delphi has, and I'm very interested in finding out what plans Rupert Murdoch's News Corporation has for the service.

Douglas S. Greene
via PC MagNet

I was extremely disappointed to see that your review of on-line services neglected to mention the only major on-line service that includes 20 hours a month of full Internet access for \$23, with subsequent hours billed at \$1.80. Delphi offers that plus many of the other features so highly

touted in your article. All this combines to make it one of the best values for my on-line dollar and for many others' on-line dollars as well. Although not as large as some of the other service providers, Delphi is a growing service that offers an excellent option for one's on-line needs.

Marilynne Nelson
via the Internet

NOT NECESSARILY IN THE FAST LANE

Your feature about on-line services was very interesting, but you didn't evaluate their efficiency or speed. I am currently an America Online user who is considering switching to other services, not because of AOL's limited number of forums or a lack of available information but because much of the time I can't log on in the evenings. And if I do successfully log on, I need to wait at least 15 to 30 minutes for each screen of information. AOL is just too slow, even with a 9,600-bit-per-second modem.

Beneton
via the Internet

Contrary to your assertions, things change daily on America Online. Software selection is good, not average, and the selection is growing daily with quality uploads—not just quantity.

Mike Bucy
Valparaiso, Indiana

Your cover story on on-line services states that on America Online, e-mail messages can't be downloaded to your hard disk. That's incorrect. Using AOL's front-end program, you can readily create directories and download all e-mail messages to your hard disk.

Donald E. Hutchings
via the Internet

ON-LINE COSTS OUT YONDER

Thanks for another informative review of the resources available to PC consumers. The plethora of on-line offerings, which is both wonderful and confusing, bodes well for the future of communications among us all. I have to make an observation, though, for those of us out in the sticks. The cost quotes for the various commer-

Remember when color TVs suddenly became affordable? Can you say déjà vu?

*U*nless you still watch a black and white TV and listen to 8-track tapes, price is probably the only thing stopping you from getting a color notebook. In which case, we'd like to introduce you to the Bravo NB. Not just because it's affordable, but also because it has features you normally don't find on notebooks costing hundreds more. Like the most advanced Dual Scan STN technology, which gives you 256 bright, clear colors on a full-size 9.5" screen. To make sure you won't have to wait to see those colors, it has a powerful Intel 33MHz 486SX microprocessor, local bus video and 512KB video memory. It also has 4MB RAM that can be expanded to 20MB and a 200MB hard drive. There's even a Type III PCMCIA expansion slot so you can send or access information from anywhere, as well as enough other features to fill that column to your right. And since our resellers perform as well as our computers, you can get one right away by calling 800-876-4AST. All of which should make choosing a color notebook as simple as, well, black and white.



BRAVO NB

POWERFUL

Intel 486SX/33 or 25MHz
microprocessor with integrated 8KB cache.
Pre-installed DOS, Windows 3.1,
and B-Tools business utility software.
Environmentally friendly NiMH
battery pack for extended usage.

ERGONOMIC

Just 6.2 pounds and 1.7 inches high.
Integrated trackball, silent travel
keyboard with 12 function keys.

CUSTOMIZE

Dual Scan STN color models
starting under \$2,400*
Active-matrix color and monochrome
models also available.

EXPANDABLE

4MB RAM standard,
expandable to 20MB. Hard drive
up to 200MB. PCMCIA
Type III enhancement cards.

RELIABLE

ExeCare™ Plus: one-year warranty
with free 48-hour expedited repair.
Technical assistance 24 hours
a day, seven days a week.



Voted PC World's Best Buy.



Call for more information
and the nearest reseller.

800-876-4AST

Dual Scan STN color now with a 486SX/33 processor for under \$2,400*

LETTERS

cial services are all based on the assumption that local (or otherwise toll-free) telephone access is available. This is simply not the case for many people living in small towns and rural areas, and the additional costs, rarely mentioned in the advertising literature, can make the commercial services unaffordable.

*Johnny Lee Lenhart
via the Internet*

FLEETING FAVORABILITY

PC Magazine's coverage of on-line services was disappointing. Having at one time or another been on most of the services you reviewed, I can't stress enough that there's an ebb and flow to all the systems mentioned. At any given time, one system can be well ahead of others, only to change quickly, thanks to software releases, price restructuring, or corporate tinkering.

*Kibben Miller
via the Internet*

THE UNDISCOVERED COUNTRY

As a PC user with limited experience, I want to express my appreciation for your explanation of the Internet ("Internet: The Undiscovered Country," March 15, 1994). Everyone seems to be talking about the Internet, but no one has been able to say outright just what it is or how to use it. I hope that I might eventually be able to revive and edit the popular old bumper sticker that reads, "Six months ago I couldn't spell Internet—now I'm on it."

*Randy Green
Rolla, Missouri*

STANDING UP FOR PRODIGY

Your review of Prodigy was unfair. I'm a long-time Prodigy member, and I've seen its costs increase, but after sampling other services, I still believe Prodigy has the best prices. You need no special software to receive Internet e-mail or file transfers, and for \$5 you can get software that organizes all of your mail into folders, keeps track of what you've sent, and maintains an address book.

*Sean P. Silverman
via the Internet*

In your review of Prodigy, you said that users had to pay for Internet messages, but you didn't mention how low the price is (10 cents each). I agree with what you said about the complex menus on the bul-

letin boards, but Prodigy claims it will be improving the interface and usability very soon, making the service easier to use.

*Carlos Hwa
via the Internet*

CORRECTIONS AND AMPLIFICATIONS

We have received more than three times the usual mail, much of it on-line mail, for our cover story of March 15, 1994, "Making On-Line Services Work for You."

Many readers wrote to question our exclusion of Delphi Internet Services Corp. from the roundup. Although we mentioned the reason in the article, we should have expanded on that.

First, Delphi's position in the market has been more that of an Internet provider than an on-line service, although it is both. Second, Delphi's user base is much smaller than that of any of the services we did review—under 100,000 members, compared with about 400,000 GENie subscribers, for example. Finally, it was unclear how Delphi's then-recent purchase by News Corporation, the international media empire, would play out. Delphi's management agreed with our thinking.

On the front-end front, readers complained about our omission of Golden CommPass (GCP), an excellent CompuServe front end for OS/2 that we had previously named one of the Best Products of the Year. Although the sidebar "On the Front Lines" was not represented or intended as a full roundup of such packages, GCP should have been included, based on its previous track record here at *PC Magazine*. We will cover its new release in an upcoming First Look.

Also in the front-end piece, we inadvertently reported that Prestige Consulting, makers of AccIS software for Windows (a CompuServe front end), also made AccIS/SM for Hewlett-Packard palmtop computers. AccIS/SM was designed by Thomas Rundel and Ernst Abresch of Germany and is unrelated. It is available on CompuServe as ACCIS9.ZIP in the HP Handhelds Forum (GO HPHAND). Furthermore, the correct phone number for the publication *The Internet Letter*

("Internet: The Undiscovered Country," March 15, 1994) is 800-638-9335.

Finally, we reported that you cannot download mail messages from America Online (AOL). To clarify: You can save the text of mail messages using AOL's Save As function, but the messages are not kept in a true mailbox where you can sort through them by subject.

The benchmark test scores for the NEC Versa 50EC (First Looks, "New 50-MHz Notebooks Dazzle with Color and Speed," March 15, 1994) reflected the performance of a system on which SmartDrive had been disabled. *PC Magazine* Labs retested the Versa with SmartDrive enabled, and the system achieved better results across all tests, most notably on the DOS disk tests, where the score rose from 201 to 682, and on the Winstone test, where the score rose from 13.3 to 26.1.

In our reviews of the Dell OmniPlex 566 and the ZEOS Pantera-66 ("Unleashing the Power of the Pentium," April 12, 1994), we inadvertently cited both Dell Computer Corp. and ZEOS International's technical support ratings as below average when in fact Dell and ZEOS have each been rated as above average in all three Service and Reliability categories.

HOW TO WRITE TO PC MAGAZINE

We welcome your comments and suggestions. Please send correspondence to Letters, *PC Magazine*, One Park Ave., New York, NY 10016-5802. You can send electronic mail to our Internet address 157.9301@mcimail.com, or you can upload it to PC MagNet (see page 12 for access information). You can also send e-mail to individual editors. Type GO PCMSTAFF on ZiffNet for a list of addresses. All letters become the property of *PC Magazine* and are subject to editing.

THE COMM PROGRAM FOR THOSE WHO INSIST ON TAKING THE EASY WAY OUT.

Our users know it. The reviews and awards confirm it. And the increasing number of people moving to Crosstalk® for Windows proves it.

Whether you need a way out to an on-line service, your favorite bulletin board or your company's host computer, the easy way is Crosstalk.

We make communicating easier with features like our QuickBar toolbar and our QuickPad™ editor, which lets even non-programmers build customized controls for frequent sessions. And those are just a couple of the reasons why Crosstalk has been the *PC Magazine* Editors' Choice for the last two years.

Everything about the Crosstalk interface is designed for speed and convenience. And naturally, along with all that ease-of-use, you get the unmatched power that Crosstalk has always been known for. *PC World* wrapped up its recent review by saying,



"Thanks to its clean and easy-to-use interface backed by its solid set of emulations and transfer protocols,

strong scripting capabilities and remote access tools, Crosstalk easily rates a Best Buy."

For a limited time, you can trade up to Crosstalk for Windows™ from any competitive product for only \$49 when you call DCA® directly.

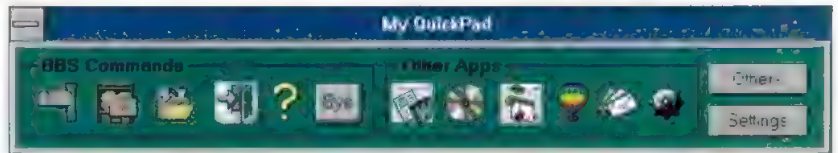
So why make it hard on yourself? Take the easy way out.

1-800-348-3221, ext. 63A*
CIRCLE 389 ON READER SERVICE CARD



"If you like a clean, uncluttered Windows interface with some of the best-designed icons anywhere, Crosstalk won't disappoint."

— *PC World Best Buy, November 1993*



You can easily create your own customized QuickPads, or use our pre-built ones for on-line services.

DCA

The Freedom To Communicate.

*Or call (404) 475-8380. Offer good through June 30, 1994. ©1994 Digital Communications Associates, Inc. All rights reserved. DCA and Crosstalk are registered trademarks and QuickPad is a trademark of Digital Communications Associates, Inc. Windows is a trademark of Microsoft Corporation. All other trademarks are the property of their owners.





Before connecting your people, connect

Now IBM PC Direct saves you time and a customized LAN that's loaded, tested

Franklin Nanney is part of our exclusive team of Network Specialists who are specially trained to configure a customized LAN right over the phone.



That's right, we deliver. Introducing **NET Select™** — a complete Local Area Network from IBM PC Direct™. Servers. Client workstations. Network and operating system software. Network interface cards. Cabling. The works.

NET Select can increase your productivity almost immediately. Just connect and plug in your systems to get started.

If you need onsite installation, we offer optional setup and cabling services. And if you order any of our ValuePoint™ client workstations, we can even preload popular business software available from IBM Soft Select™.

The net result? You save time, money and frustration. Just call one of our IBM PC Direct Network Specialists. They're trained to help you configure your dream LAN. On the phone. At a price you'll like.

IBM quality from one end to the other.

For your server, choose a customized IBM ValuePoint Mini-Tower® or IBM PS/2® Server 85. Then pick any IBM ValuePoint system for your client workstations. Your choice of NetWare® from IBM or IBM OS/2® LAN Server is part of the package, too, plus the choice of preinstalled Ethernet® or Token-Ring™ cards.

IBM HelpWare® support around the clock.

Here's one of the best support programs anywhere, with around-the-clock assistance from the Personal Systems HelpCenter® for your IBM hardware (via phone, fax or electronic bulletin board), plus a 30-day moneyback guarantee.* And there's onsite service *anywhere* in the U.S.² from dedicated IBM customer engineers.

There's more. Network Support HelpPacks give you the flexibility to buy the technical assistance — for both hardware and network operating systems — that's right for your entire network. At affordable prices.

IBM PC Direct

We're putting the personal in personal computing.

*IBM PC Direct prices only. Includes \$10 Soft Select preload fee per client system. The offerings, prices and products are subject to change or withdrawal without prior notice. Offer is not available outside the United States. Products you acquire may not be counted under any existing Volume Purchase Agreement. The same offerings and products may be available through IBM Authorized Remarketers. Remarketer prices may vary. Shipping and handling charges are extra. **Some 486DX/33MHz chips may be manufactured by IBM. 1. Copies of warranty and 30-day moneyback guarantee information available through IBM and IBM Authorized Dealers. Please call 1 800 426-2968 for details regarding

NET Select: A complete LAN, from server to clients and everything in between.

Whether you're networking 2 or 250 users, there's an IBM server that can do the job. Through NET Select, you can choose from either an IBM ValuePoint Mini-Tower or an IBM PS/2 Server 85 466.

ValuePoint Mini-Tower 6387

- **CPU:** 486DX/33MHz** or i486DX2/66MHz processor
- **Storage:** 527MB Hard Disk, and one optional 170, 245, 340, 424 or 527MB Hard Disk
- **Memory:** 8MB RAM standard, upgradable to 64MB
- **Network Interface Card:** Ethernet or Token-Ring
- **Operating Environment:** IBM DOS with NetWare from IBM V.3.12 or IBM OS/2 LAN Server 3.0, Entry
- **Prices start at \$3,029*** (monitor not included)



PS/2 Server 85 466

- **CPU:** i486DX2/66MHz processor with 256KB L2 (write-back) cache, upgradable to Intel® Pentium® OverDrive™
- **Storage:** 540MB or 1GB SCSI-2 fast Hard Disk and four optional 540MB, 1GB or 2GB Hard Disks. Standard SCSI-2 fast and wide data streaming busmaster controller
- **Memory:** 8MB RAM standard, upgradable to 232MB
- **Network Interface Card:** Ethernet or Token-Ring
- **Operating Environment:** IBM DOS with NetWare from IBM V.3.12 or IBM OS/2 LAN Server 3.0, Entry
- **Prices start at \$5,779*** (monitor not included)



Sample configuration
\$8,359*

with us.
money with
and network ready.

An affordable three-user LAN

Our sample configuration (shown above) is the economical and easy way to set up a network for three users. It's delivered preloaded with the operating system and network software to meet your needs.

ValuePoint Mini-Tower 6387 Server

- i486™DX2/66MHz processor
- 527MB Hard Disk
- 8MB RAM
- IBM 14L8 14" Color Monitor (SVGA)
- Ethernet interface card
- IBM DOS and NetWare from IBM V.3.12 — 5 users

ValuePoint Si Clients (3)

- i486SX/25MHz processor
- 120MB Hard Disk
- 4MB RAM
- IBM 14L8 14" Color Monitor (SVGA)
- Ethernet interface card
- IBM DOS and NetWare from IBM Client
- **Price: \$8,359***



There's a ValuePoint client workstation that's right for your business.

Your NET Select LAN comes with one of the world's favorite PCs as clients: the IBM ValuePoint.

Most ValuePoint systems can be preloaded with your network requester and popular application software, through IBM's Soft Select service. You choose from the world's best-selling business software at great prices. And we'll preload, test and optimize all your selections on your LAN for a single fee of just \$10 per client.

ValuePoint client configuration options

- **CPU:** i486SX/25MHz to i486DX2/66MHz processor
- **Storage:** 120MB Hard Disk, up to 527MB
- **Memory:** 4MB RAM standard, upgradable to 64MB
- **Monitor:** IBM 14L8 14" Color Monitor (SVGA)
- **Network Interface Card:** Ethernet or Token-Ring
- **LAN Requester:** NetWare from IBM Client, or OS/2 LAN Server Requester
- **Applications:** Choose from popular business software applications available preloaded from IBM Soft Select
- **Prices start at \$1,519*** (prices may vary depending on configuration selected)



**To order:
Call 1 800 426-7390**

8am-10pm M-F, EST
9am-5pm Sat., EST



Purchase orders available for qualifying customers.

75MHz.



INTRODUCING THE T4800CT. Fasten your seatbelt and enjoy portable multimedia computing in high gear. Race through your number-crunching and graphics-intensive applications on the scorching 75MHz IntelDX4 processor. Load all you want into the massive 500MB hard drive. Enjoy the thrust of an integrated

T4800CT FEATURES:

- 75MHz IntelDX4™, 3.3 volt processor, 16K cache
- 9.5" dia. color SVGA TFT-LCD active matrix display
- 500MB HDD
- 8MB RAM expandable to 24MB
- Two PCMCIA slots (16mm and 5mm)
- VL Local-Bus video
- Integrated graphics accelerator
- .WAV Audio
- Audio jacks: Headphone/Speaker and Microphone
- 6.9 lbs.
- NiMH battery for extended life
- 3.5" 1.44MB floppy disk drive
- Ballpoint™ Mouse with QuickPort™
- Pre-installed software: DOS, Windows for Workgroups®, Windows Sound System™, Run Time and Video for Windows, and Indeo™ video



OPEN 'ER UP.

Enjoy SVGA graphics, presented in 256 simultaneous colors on Toshiba's vivid 9.5" diagonal color TFT-LCD active matrix display.

Dock in the optional Desk Station IV for instant connection to your monitor, full-size keyboard, printer, and network.



The T-Plan service program provides bumper-to-bumper protection for years to come.



The built-in microphone allows you to make voice annotations. Use the microphone jack for higher quality recordings.



indeo Fire-up the new software standard for video playback in your multimedia presentations.



Dual PCMCIA expansion slots—Type II and an oversized Type III—can run simultaneously to give you almost limitless flexibility.



500MB Now you can keep full multimedia files on your portable.



Use the LCD status bar as your dashboard to monitor battery usage, AutoResume, disk drive activity, e-mail, and more.

The integrated sound system and speaker, plus port for external headphones or speakers, let you present loud and clear.



graphics accelerator, VL Local-Bus video, Indeo video, and full audio capabilities. Give the most dazzling presentations wherever your work takes you. With all this power, plus PCMCIA flexibility, you'll be ready for wherever the future takes computing. See how it feels. Call 1-800-457-7777 for the dealer nearest you.

In Touch with Tomorrow
TOSHIBA

© 1994 Toshiba America Information Systems, Inc. All products indicated by trademark symbols are trademarked and/or registered by their respective companies. The Intel Inside and Indeo video logos are trademarks of Intel Corporation.

CIRCLE 379 ON READER SERVICE CARD

RUNNING WINDOWS WITHOUT NORTON DESKTOP? YOU PROBABLY SWIM AFTER A BIG MEAL AND THEN RUN AROUND THE POOL WITH SCISSORS, TOO.

Listen up, you risk-takers. What would your mother say if she saw you now?

No doubt she would tell you to go right out and get the new Norton Desktop 3.0 for Windows before you damage yourself. Or your computer.

That's because NDW 3.0 not only enhances your work, it's also the safest way to run Windows short of

tapping directly into Bill Gates' subconscious. Made by Peter Norton, it's packed full of utilities to provide a safer working environment.

Like our new Norton AntiVirus 3.0, which protects your system against over

2,300 known viruses, and our new Norton BackUp™ 3.0 with enhanced support for SCSI drives. There's also the new UnErase, to recover accidentally erased files. Disk Doctor for automatic disk diagnosis and disk repair. And a Fix-It disk with a full collection of DOS utilities to recover and repair files or entire disks, even if you can't run Windows. And now for the first time, you'll be able to run Speed Disk under Windows to boost performance.

In addition, NDW 3.0 simplifies Windows for you by integrating file and program management. And while the new FileAssist will allow you to easily manage your files without having to leave your applications, the new Day Planner will allow you to easily manage your life. And who doesn't need a little help with that?

Plus, the new "push button" Control Center allows you to customize pull-down menus, icons, toolbars and a lot more to make sure that Windows looks and works exactly the way you want it to.

So the choice is yours. Either see your local dealer, call 1-800-628-4777, ext. 9115 to order, or live a life full of danger and recklessness, running Windows without Norton Desktop 3.0 for Windows and sprinting around pools with sharp objects until you finally put somebody's eye out.

Of course, you would be absolutely crazy not to pick up your own copy of NDW 3.0 today. And remember, don't run Windows without it!

**THE NORTON
DESKTOP**
FOR WINDOWS
SYMANTEC.

For information in Europe, call 31-71-353111. Australia, 61-2-879-6677. Canada, 1-800-667-8661. Elsewhere outside U.S., 408-252-3670. The Norton AntiVirus and Norton Disk Doctor are registered trademarks and Norton BackUp, Norton Desktop and Speed Disk are trademarks of Symantec Corporation. ©1994 Symantec Corporation. All rights reserved.

CIRCLE 117 ON READER SERVICE CARD

Trends

TRENDS & TECHNOLOGY SHAPING THE PERSONAL COMPUTER MARKET

The Chicago PC

New hardware exploits Microsoft's next OS.

Chicago, the successor to Windows 3.1, will be full of new technologies, but will your PC be able to take advantage of them? Microsoft is adding plug-and-play hardware support, preemptive multitasking, and support for 32-bit applications, but as long as you have a

386 with 4MB of RAM, Microsoft virtually guarantees that Chicago will run. According to Carl Stork, director of the Windows Platform Definition at Microsoft, "today's PCs are fully capable of running Chicago."

But future PCs will run Chicago even better. In fact, Microsoft is proposing a shopping list of new features that hardware manufacturers can build into PCs. At the

lution with 256 colors, and a local bus.

Microsoft is also recommending that manufacturers adopt new hardware interfaces to make Chicago PCs friendlier. For instance, the Enhanced Capabilities Port (ECP) would direct output to a printer at top speed and enable the printer to send intelligent messages back to the PC. Microsoft also recommends VESA's proposed Display

Data Channel, which is a specification for two-way communications between next-generation monitors and systems.

To ensure that hardware and drivers are truly Chicago-compatible, Microsoft will distribute hardware-compatibility tests to manufacturers. They will cover entire systems to measure compatibility with the plug-and-play BIOS and will let makers of add-in devices test the compatibility of the hardware as well as the drivers. A "Chicago-compatible" logo will indicate that a product has passed the test.

Based upon Microsoft's latest status report, Chicago will go into a progressive beta program this spring and will eventually encompass hundreds of thousands of users. When can you buy Chicago? "The target ship date is the end of 1994," says Paul Maritz, a senior vice president of Microsoft's systems division.

—Christopher Barr

Touch 'n' Point

DON'T LOOK NOW, BUT ANOTHER innovative pointing device for notebooks is heading your way. While trackballs pop out of screens and dangle off keyboards and pointing devices perch in various locations (the HP OmniBook's mouse even hides inside its own little garage),

the latest class of pointing device is based on an old idea—the touch pad.

Past efforts to make a touch-sensitive pointing device failed because the devices did not have the sensitivity that is necessary for precise control of the cursor. You needed to press together two membranes and maintain the pressure with your finger. This mechanical setup was awkward and resulted in imprecise cursor control.

Field distortion sensing, a new technology developed by Cirque Corp. of Salt Lake City, Utah, determines the exact position of your finger's center point—the "centroid"—as you slide your finger gently over a touch pad. This provides the resolution needed for pixel-by-pixel control. Your finger distorts the electrical field emitted by the touch pad. Electrodes detect this distortion, and an integrated circuit measures it. Double clicking requires only two light taps on the surface. "It's much more intuitive than a mouse or track ball," says Kimball Brown, vice president and chief analyst of mobile computing at Dataquest.

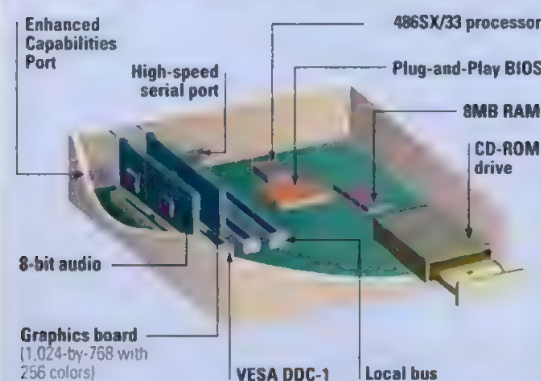
Cirque has joined with Alps Electric to manufacture the GlidePoint for notebooks. Sources say the GlidePoint will also be in Apple's next PowerBook. Cirque hopes the technology will be used as a control for interactive televisions, video games, and home appliances.

Meanwhile, vendors of notebook PCs, such as Compaq and Toshiba, continue to experiment with new portable pointing device ideas. The goal: To find the device that can replace the mouse all the time. After all, that's the point. —Carol Levin



Chicago-Ready PC

Microsoft claims Chicago will run well on a 386-based PC with 4MB of RAM but will run better on a 486 with 8MB of RAM.



top of the list is a plug-and-play BIOS for easy installation of adapters and peripherals, followed by faster parallel ports, improved video specs, and a host of multi-media hardware. According to Microsoft, a typical Chicago desktop PC in 1995 should have a 486SX/33 processor, 8MB of RAM, a video system capable of 1,024-by-768 reso-

Pipeline By Robin Raskin

The Hysterical Verge Of Convergence

I recently spent some time at Convergence '94—a trade show devoted to interactive television. The show focused primarily on the tangibles: the digital set-top box that will replace the analog cable-TV set-top box currently in 54 million homes in the U.S., and the combination of older analog and newer digital wiring that will bring content to the box. Content, it seems, would follow once it had somewhere to go.



Stranger in a strange land, I waltzed amid aisles of tenuous collaborations such as the Skywalker project, a joint venture of Scientific-Atlanta, Kaleida Labs, and Motorola formed to develop set-top boxes based on PowerPC processors—the next generation of set-top devices. A new venture from US West, called Interactive Video Enterprises (IVE) also caught my eye.

There seemed to be two necessary credentials for exhibiting: a pedigree, and an involvement in an experimental trial. Everyone exhibiting was involved in a newly formed alliance and was testing the fruits of their technology partnerships on the normal folk—American consumers about to be transformed from TV viewers into TV doers.

IT Network targeted 150 households in Denton, Texas, for its interactive TV test. Viacom claimed 1,000 homes in California's Castro Valley. Bell Atlantic and FutureVision staked out 38,000 homes in Toms River, New Jersey, and Time Warner is still promising to get 4,000 users in Orlando, Florida, up and running

on a Scientific-Atlanta set-top box powered by Silicon Graphics boards and MIPS 4000 processors.

Some players are differentiating themselves from the rest of the test-bed crowd by stating that their rollouts will be for real rather than simply being tests. For example, Pacific Telesis and Hewlett-Packard Co. plan to offer a commercial rollout of video-on-demand in California by 1995. And while Microsoft was absent from the Convergence scene, its plans to build a video server and set-top box were not underestimated by the attendees.

It occurred to me that like most newlyweds, this bunch will be hard-pressed to make ends meet. There are going to be many divorced partners and some big money lost by the time the test phase of interactive TV is complete. Winners will be few, but they'll win really big. With the average price of a set-top box somewhere in the \$100 to \$300 vicinity, and the average bill per home ranging anywhere from \$2 to \$10 per month, it's pretty easy to see that you've got to be servicing a lot of homes to make a profit, especially when providers of set-top boxes, operating systems, middleware cabling, database back-ends, and content are all vying for their share of the profits.

The easier money will be made by supplying the links to connect these big-player technologies together. HP or AT&T may have the video server, Oracle may have the database, Kaleida or Microsoft may have the operating system, the regional phone companies and the cable companies may have the plumbing, and there's no end to the content that will find its way into the chain. What's missing is the specialized software to handle on-line shopping transactions, fulfill on-line purchases, or branch plot lines in interactive soap operas. While the big guys are getting married and divorced, small software developers may have the chance of the lifetime to get in there and steal the bacon.

Robin Raskin is editor of PC Magazine.

Burn, Baby, Burn

IF YOU'VE EVER OWNED A MONOCHROME monitor then you know why screen savers were invented. On older monochrome displays, if you left one application on for most of the day, the image could burn in. How many monochrome monitors out there have a ghostly spreadsheet grid permanently imprinted in their phosphors? Today's color displays are better made and graphical user interfaces make it highly unlikely you'll burn an image into your display.

The screen saver market is segmenting now, and two types of screen savers will emerge: those that actually save your display by blanking the

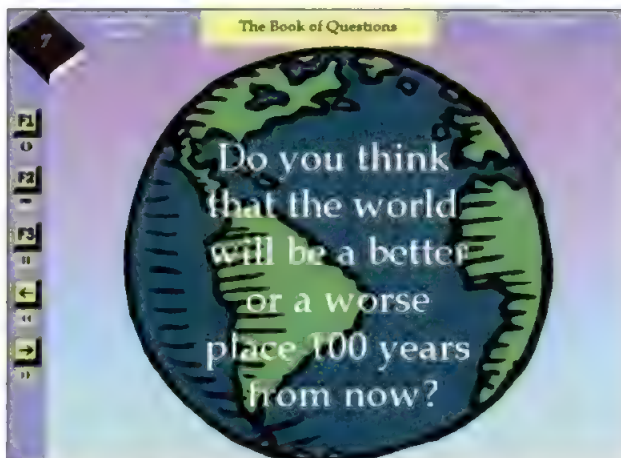
screen, and those that are strictly for entertainment purposes.

The frivolous-screen-entertainment category offers a perfect way to personalize your PC. While you can get Star Trek and Disney screen savers now, LucasArts Entertainment will soon ship Star Wars Screen Entertainment with characters and footage

from the Star Wars movie trilogy. After a timed period of inactivity, cute little Jawas will run across your screen, or Luke Skywalker will duel with Darth Vader.

If you're the introspective type, you can load Journeyware Media's *The Book of Questions*, which will pose thought-provoking questions such as, "If you could script the basic plot for the dream you will have tonight, what would the story be?" The \$39.95 program comes with hundreds more questions. Journeyware Media (800-256-1994) will offer *Life's Little Instruction Book* later this year.

Berkeley Systems wants you to have it both ways. Its *After Dark* series of screen savers provides entertainment, but future versions will blank your screen in an effort to save energy. Using technology that invokes VESA's Display Power Management Signaling specification, *After Dark* screen savers will work with new Energy Star-compliant monitors that power down to save energy. Not to worry, it's user configurable so you can be entertained for a while before the monitor goes dark.—Christopher Barr



The Book of Questions: A screen saver to make you think.

Virtual Hardware

DIGITAL SIGNAL PROCESSORS, ONCE discussed mainly among high-end modem and sound card mavens, are moving into the mainstream. According to Texas Instruments, between 60 and 70 million DSPs will be sold in 1994 and 300 million will be sold in 1997.

Simply put, a DSP is a chip that executes signal algorithms at high speeds; some are single-purpose and some are programmable. A card with a programmable DSP chip can alter its personality by means of "task software," programs that instruct the chip to become, say, a fax modem, a sound card, and an answering machine. One way to

think of it is as virtual hardware.

Single-purpose DSPs are widespread; they are in modems and sound cards and hard disk controllers. (PC Magazine Labs tested DSP-based sound boards in our issue of April 12, 1994.) But the adoption of multifunction DSP boards has been stalled by the proprietary nature of DSP programming technology. That's changing now that the price of DSP chips has dropped dramatically, and now that software developers are close to adopting a standard method for applications to work with chips from any manufacturer—Analog Devices, Motorola, National Semiconductor, or Texas Instruments.

Last fall, Microsoft joined with Spectron Microsystems of Santa Barbara, California, to deliver the tools programmers need to build task software. Spectron's SPOX operating system kernel, which is embedded in chips from several manufacturers, orchestrates the activities of the DSP, telling it when to digitize and compress speech or receive an incoming fax. The OS is the key to Microsoft's forthcoming DSP Resource Management Interface, a programming framework that's based on Chicago, the next generation of Windows.

With a standard in place, "manufacturers will compete on speed and performance, not on whether the software will work," explains

Philip Dodd, executive director of the Interactive Multimedia Association. But developers aren't waiting around for Chicago, which is expected by the end of the year. Today, Motorola's PC Media Developer's Kit supplies programmers with the tools that they need to build "soft" fax modems, speakerphones, wavetable synthesizers, voice-recognition and speech-synthesis engines,

and answering machines that run on Motorola's DSP56000 chip. "A whole new area of commercial enterprise is opening up," says Jerry Ressler, president and CEO of Media Star, a developer of sound and

What's New in DSP Technology: MVP

Texas Instruments recently unveiled what it considers to be the mother of all DSPs, the Multimedia Video Processor (MVP). With more than 4 million transistors and a 32-bit RISC processor at its core, the programmable MVP is more powerful than many microprocessors. On board the chip are four DSPs that can handle parallel processing, a floating-point unit, an SRAM cache, and two video controllers.

The MVP chip was immediately endorsed by a number of companies. Sony Electronics plans to develop an entire line of digital chassis displays based on it. SuperMac plans to use the MVP chip to speed the compression of its Cinepak video-compression technology.

At \$400, the MVP is geared for high-end multimedia hardware, such as real-time video compression boards used by video production companies and high-speed video-conferencing boards. Texas Instruments also feels the MVP can be used in set-top cable converters to decode the kind of video-on-demand signals that should be prevalent in a few years.

—Christopher Barr

telephony DSP boards.

Currently there are only a few PCs that come with a DSP already on-board, including Apple's Quadra AV, Compaq's Presario, and the IBM ThinkPad.

By next year, industry players expect that DSP technology will move from add-in boards onto motherboards, but Ressler points out that the journey to that point won't be an easy one, even though DSPs are already on the motherboards of workstations of vendors like Digital and Silicon Graphics. "Large OEMs still have some reservations about putting DSPs on the motherboard because they require

such a high level of integration. To get a basic level of functionality requires a certain amount of space, and the technology just isn't as integrated as they would like to see it.

—Carol Levin

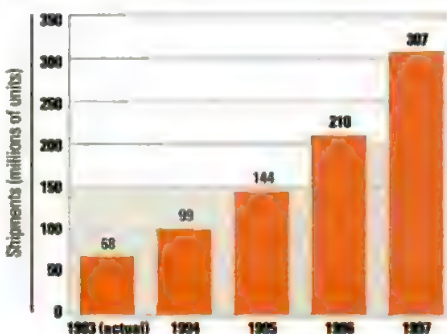
Top Retail Software

Current ranking	Last issue	Product/company
1	10	MS Office 4.0 for Windows Upgrade Microsoft Corp.
2	1	MS-DOS 6.2 Upgrade Microsoft Corp.
3	—	MS Windows for Workgroups 3.11 Microsoft Corp.
4	—	WordPerfect 6.0 for DOS WordPerfect Corp.
5	—	Stacker 4.0 Upgrade Stac Electronics
6	—	CheckIt PRO: Set TouchStone Software Corp.
7	14	Procomm Plus for Windows 1.02 Datastorm Technologies
8	—	MS Office 4.0 for Windows Microsoft Corp.
9	—	MS Works 3.0 for Windows Microsoft Corp.
10	6	QEMM 7.0 Quarterdeck Office Systems
11	—	MS Publisher 2.0 for Windows Microsoft Corp.
12	—	WinFax PRO 3.0 Delrina Technology
13	—	MS Excel 5.0 for Windows Upgrade Microsoft Corp.
14	4	Quicken 3 for Windows Intuit
15	—	Quattro Pro 5.0 for Windows Borland International

This list ranks PC business programs according to the total number of copies shipped to stores and resellers in the week ending March 5, 1994. The list is based on shipments to more than 12,000 retail locations. It does not include sales made directly by software publishers and can not be interpreted as a picture of the entire software market. Sales information is adapted from a compilation by Ingram Micro.

Rosy Forecast for DSP Chips

Shipments of DSP chips are projected to surge in the next few years. And according to Will Strauss of the market research firm Forward Concepts, "every time the volume of industry shipments doubles, the cost drops 30 percent."



Source: Forward Concepts

Technology on Campus

DOES YOUR ALMA MATER HAVE A "New Media Center"? An initiative teaming academia with industry leaders is encouraging the use of advanced multimedia hardware and software in university courses. Using expertise from the computer industry, universities are building new media centers (NMCs) to serve as advanced technology hubs on campus and are incorporating the new technologies into existing academic computing programs.

"It's an attempt by high-tech industry leaders to help universities set up integrated multimedia solutions to further higher education at reduced costs," says Eric Wilson, director of the New Media Centers Program based in San Jose, California. Twenty-two campuses will participate in the project, which is spearheaded by Macromedia, and the number should expand to 100 by 1996, says Wilson. The budgets available for NMCs vary from \$40,000 to \$800,000 per institution, and most sites plan to purchase at least 80 multimedia systems and peripherals to go with them.

The companies involved, including Adobe, Apple, Eastman Kodak, Prentice Hall, Sony, and SuperMac benefit, too. "By offering attractive pricing, we jump start these [multimedia] activities, and the institutions make the necessary infrastructural investments," says Bill Keegan, a spokesman for Apple. "By putting these tools of change into the hands of decision makers, we'll see a much faster adoption rate of these technologies," he adds.

The projects on the drawing board are as varied as the participating schools. Princeton's NMC will house a design and publishing laboratory for producing interactive course supplements. The University of New Mexico will use multimedia technology to work with people with physical and cognitive disabilities. Film students at New York University will experiment with state-of-the-art video-editing and production techniques. Hostos Community College in the Bronx, located in the country's poorest congressional district, will prepare students for the work force by using multimedia technology in health sciences and early-childhood-education programs. "Through the new media center, we'll be able to empower our students with technology," explains Awilda Orta, dean of planning, research, and development.

Briefs

MODEL YOUR OWN BRAIN WAVES IN 3-D.

If you've been wondering where to buy an interactive brainwave visual analyzer, call New York-based IBVA Technologies (212-754-4282). Its \$1,295 IBVA system uses a lightweight headband to pick up brain activity and transmit it to a computer in real time where it's converted into digital signals that can interact with applications. (You can also store them for future use.) One prototype car-racing game uses the headband as an input device. When you relax, the car speeds forward; tense up, and it runs out of gas.

ENVIRONMENTAL PROTECTION AGENCY

hot line. To request a fax listing of all Energy Star-compliant computer hardware, call the Energy Star Computers Hotline at 202-233-9114.

Students at Bennington College in Vermont are expected to produce their senior theses on CD-ROM and to create electronic, multimedia portfolios of their work. Says Bennington's Phil Holland, "We believe mastery of multimedia technologies will be integral to the future."—*Melissa J. Perenson*

KOREA, JAPAN, AND BRAZIL ARE AMONG

the 30 countries cited for inadequate protection of U.S. intellectual property, reports the Business Software Alliance. "Software piracy continues to plague the industry around the globe, stifling innovation and growth, with an annual price tag exceeding \$12 billion," says BSA president Robert Holleyman.

SHAREWARE ON CD-ROM: TRY-BEFORE-

you-buy. The ASP Advantage CD-ROM (\$24.95) from the Association of Shareware Professionals includes full working versions of 1,000 DOS and Microsoft Windows shareware programs for the business, the home, and the kids. If you like and use a program, you send in a registration fee to the company (or the person) that created it. Contact the ASP at 616-788-5131.—*Carol Levin*

pared with the \$5,000 price tag that head-mounted systems usually sell for, it's a bargain.

The VFX1 has two minidisplays in the visor that are actually 256-color active-matrix screens, each with 428-by-244 resolution. They make it seem as if you're looking at a 35-foot screen that's 35 feet in the distance. The head-tracker electronics can tell if your head is bobbing from side to side or pitching and rolling.

The headphones go into your PC's sound board, and the VFX1's adapter card fits into a 16-bit ISA slot.

The first VR game capable of using the VFX1 will be Knowledge Adventure's Speed. Although you can now run Speed with a mouse or a joystick, the VFX1 will give you a true 3-D experience. With the visor down, you will be able to travel through a 3-D maze, listen to 3-D sound, and lose your lunch on a 3-D roller coaster. Knowledge Adventure is developing more VR titles that work with the VFX1, and other major game developers are not far behind.

—*Christopher Barr*

Head Games

A GAME PLAYER CAN SPEND A LIFETIME looking for the perfect accessory to give a game just the right feel. While driving aficionados are stuck with joysticks that don't quite simulate a leather-covered steering wheel, flight simulators can use yokes that look as if they've been ripped from a Cessna.

By the next holiday shopping season there will be an affordable peripheral for virtual reality game players. Affordable, that is, if you've just won the Lotto. Maybe \$1,000 is a bit too much to spend on a game device, but Forte Technologies' (716-427-8595) VFX1 head-mounted system is the coolest peripheral you can buy for your PC. And com-



Music To Your Eyes.

The ZEOS ColorNote... scaling new heights.



With color and power you can't beat, the ZEOS ColorNote 486 is the only color notebook worth taking note! Now that we've scaled back prices by as much as \$200, you'll never find a better value.

Just look what we give you: a reliable 486SX Intel processor running at 33MHz with 8K built-in cache; enough memory and power to run Windows; 4MB or 8MB RAM (expandable to 20MB); an 80MB, 120MB or 170MB IDE hard drive. And, we added local bus video for super-fast video performance.

Blazing colors seem to sing. Images are vibrant and alive. For a crisp VGA backlit screen displaying up to 256 colors, the ColorNote employs dual scan technology—a breakthrough that achieves color comparable to that of a desktop color monitor yet is not as expensive as active matrix.



ZEOS dual scan screen (left) fires up rich, vibrant colors while standard passive matrix screen (right) produces faded and dull colors. Photos are not retouched.

What's more, it comes equipped with a PCMCIA slot, an internal floppy drive, built-in trackball and a Nickel-Metal Hydride battery. If your needs go beyond the standard scale, you can compose a personalized package with our many options. Let the ColorNote be the basis for your creative scores and presentations.

AWARD-WINNING SERVICE

ZEOS has won more *PC Magazine* Readers' Choice for Service & Reliability awards than any other company—five in all!

We're here for you 24 hours a day, 365 days a year, and always a toll-free call away. All ZEOS systems come with a One Year Limited Warranty and 30-Day Money-Back Guarantee.

Flux Orders: 800-362-1205 or 612-362-1205.
Government: 800-245-2449, Outside U.S.
and Canada: 612-362-1212. Purchase Orders,
MasterCard, VISA, Discover, Am Ex,
Z-Card™ COD and affordable leasing pro-
grams. Open 24 Hours a Day 365 Days a Year!



STANDARD WITH EVERY ZEOS COLORNOTE 486

- 33MHz 486SX Intel processor.
- RAM expandable to 20MB.
- IDE hard drive expandable to 170MB.
- 8K internal cache.
- Internal 3.5" 1.44MB floppy disk drive.
- PCMCIA slot supporting a type I, II or III device.
- 512K video RAM.
- Local bus video for super-fast video performance.
- Display: 640 x 480 dual scan color VGA backlit LCD, 9.4" diagonal, up to 256 colors.
- Supports an external SVGA color monitor at resolutions up to 1024 x 768.
- 82-key keyboard with embedded numeric keypad and 12 dedicated function keys.
- Built-in trackball.
- Replaceable and rechargeable NiMH battery.
- One serial port, parallel port, keyboard port, mouse port and external video port.
- Full power management features include Low Power mode and programmable Stand-by features.
- AC adapter from AC110-240V to DC.
- 8.54" x 11.65" x 1.5"; 5.6 lbs.
- FCC Certified Class B; UL Listed.
- Complete ZEOS Customer Satisfaction Package.

PACKAGE 1

ColorNote 486: \$2193
Lease \$79/month
■ 4MB RAM
■ 80MB IDE hard drive

PACKAGE 2

ColorNote 486: \$2395
Lease \$87/month
■ 4MB RAM
■ 120MB IDE hard drive
■ Microsoft DOS 6.2
■ Microsoft Windows for Workgroups 3.11
■ Lotus Organizer

PACKAGE 3

ColorNote 486: \$2695
Lease \$98/month
■ 8MB RAM
■ 170MB IDE hard drive
■ Custom nylon carrying case
■ Microsoft DOS 6.2
■ Microsoft Windows for Workgroups 3.11
■ Lotus Organizer

CALL NOW TOLL FREE
800-554-7172

Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 36-month lease, 8% purchase option. All prices, specifications and availability are subject to change without notice; call to confirm these and warranty details. Prices do not include shipping. All products and company names are trademarks or registered trademarks of their respective holders. ZEOS is a registered trademark. Z-Card and Computers Now! are registered servicemarks. ColorNote is a trademark of ZEOS International Ltd. ©1994 ZEOS International Ltd. 100 Federal Blvd. Minneapolis, MN 55413 (USA). ZEOS is a publicly traded company (NASDAQ symbol: ZEOS).

THE ZEOS® FREESTYLE™... THE FLEXIBLE SYSTEM FOR YOUR EVERY POSITION.

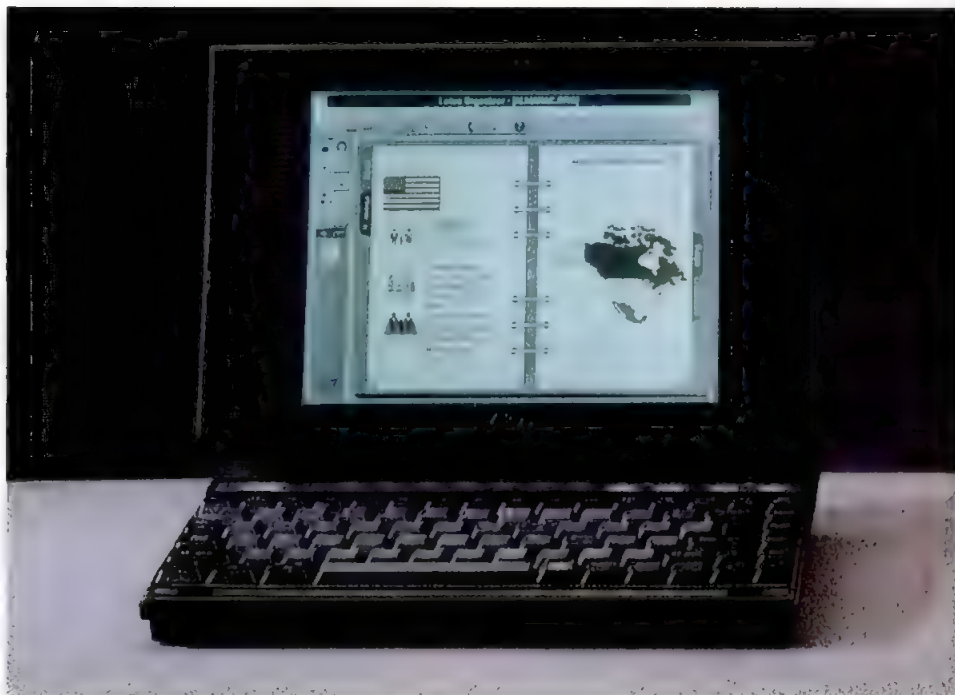
The feeling of freedom is unrestricted and comfortable. It's also power and strength. The ZEOS Freestyle gives you freedom of movement, power, and so much more.



The only notebook on the market with the revolutionary tilt and swivel screen, the Freestyle allows you to adjust

the screen to the perfect viewing angle—no matter what your position. Use it in your lap, on a plane or for presentations.

For maximum power, we've given you the option of 386SL or 486SL Intel processors and memory options from 2MB to 20MB. We've also included such features as a built-in mouse



Unbeatable Notebooks At A



*Unique tilt and
swivel display
moves for your
every position.*

key, internal floppy drive, soft carrying handle and many power management features. In addition, we offer an array of accessories. At only 5.6 pounds, including the battery, you'll want to take it everywhere.

Full desktop power with movement. It's a flexible choice. Why not call us to enhance your position? Your Systems Consultant can be reached at 800-554-7172.

TOLL-FREE SUPPORT & WARRANTIES

We're here for you 24 hours a day, 365 days a year, and always a toll-free call away. All ZEOS systems come with a One Year Limited Warranty and a 30-Day Money-Back Guarantee. So call us now!

STANDARD WITH EVERY ZEOS FREESTYLE

- 25MHz 386SL, 25MHz 486SL or 33MHz 486SL Intel microprocessor.
- 386SL: 64K SRAM system cache
486SL: 8K internal system cache.
- RAM expandable to 20MB (486SL) or 10MB (386SL).
- IDE hard drive expandable to 260MB.
- 640 x 480 VGA backlit LCD display, 9.5" diagonal supporting up to 64 shades of gray.
- Unique tilt and swivel display.
- 256K (386SL) or 512K (486SL) video RAM.
- Supports an external SVGA color monitor with simultaneous display capability.
- Internal 3.5" 144MB floppy drive.
- Serial, parallel, video and PS/2 (for keyboard, mouse or 10-key pad) ports.
- 486SL includes 3.3V technology for added battery life, and a built-in math coprocessor.
- Replaceable and rechargeable NiCad battery.
- 81-key keyboard with built-in mouse key, "inverted T" cursor keys and dedicated Home, PgUp, PgDn, and End keys.
- AC adapter from AC110-240V to DC.
- Power-saving features.
- FCC Certified Class B.
- Complete ZEOS Customer Satisfaction Package.

PACKAGE 1

386SL-25: \$995

Lease \$42/month

486SL-25: \$1495

Lease \$63/month

486SL-33: \$1695

Lease \$61/month

- 2MB RAM (386SL); 4MB RAM (486SL)
- 80MB IDE hard drive (386SL); 120MB IDE hard drive (486SL)
- MS-DOS 6.2

PACKAGE 2

386SL-25: \$1495

Lease \$63/month

486SL-25: \$1795

Lease \$65/month

486SL-33: \$1995

Lease \$72/month

- 6MB RAM (386SL); 4MB RAM (486SL)
- 120MB IDE hard drive (386SL); 180MB IDE hard drive (486SL)
- Custom nylon carrying case
- MS-DOS 6.2
- Microsoft Windows for Workgroups 3.11

PACKAGE 3

386SL-25: \$1995

Lease \$72/month

486SL-25: \$2195

Lease \$79/month

486SL-33: \$2395

Lease \$87/month

- 10MB RAM (386SL); 8MB RAM (486SL)
- 180MB IDE hard drive (386SL); 260MB IDE hard drive (486SL)
- Internal 96/24 send/receive fax modem
- Custom nylon carrying case
- Extra battery
- External charging stand
- MS-DOS 6.2
- Microsoft Windows for Workgroups 3.11

Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 36-month lease; 10% purchase option. All prices, specifications and availability are subject to change without notice; call to confirm these servicemarks. Freestyle is a trademark of ZEOS International Ltd. © 1994 ZEOS International Ltd., 1301 Industrial Blvd.,



THE ZEOS® CONTENDA... THE TRAVELER'S DREAM AT AN IDEAL FARE.

What a dream! The ZEOS Contenda subnotebook is small enough to tuck away in your briefcase and so light you'll forget you have it! It's the perfect traveling companion.

All your business and home needs conducted in a bundle just shy of 4 pounds. Write letters and memos. Create presentations. Keep in touch with associates through an internal send/receive fax modem. Organize your files, calendar, planner and more.

What's more, with a standard 80MB or 120MB hard drive, memory up to 10MB and your choice of a 386SL-25 or 486SL-25 Intel processor, the Contenda has

*Smaller than
a notebook.
Lighter than a
hard cover novel.*



Simply Irresistible Price...\$995.

STANDARD WITH EVERY ZEOS CONTENDA

- 25MHz 386SL or 486SL Intel microprocessor.
- RAM expandable to 8MB (486SL) or 10MB (386SL).
- 486SL: IDE hard drive upgradable to 120MB.
- Display: 640 x 480 VGA backlit, .23 dot pitch. Sharp 74" diag., up to 64 gray shades.
- 256K (386SL) or 512K (486SL) video RAM.
- 486SL version includes 3.3V technology for added battery life, PI local bus for video acceleration, high-speed floppy drive controller, and built-in math coprocessor.
- Supports simultaneous display with an external SVGA color monitor.
- Replaceable and rechargeable NiMH battery.
- 80-key keyboard with embedded numeric keypad and easy-to-use built-in trackball.
- Serial, parallel and video ports, plus ports for internal fax modem and external floppy drive.
- AC adapter with full range from AC110-240V to DC.
- Fully-featured power management.
- 9.7" x 6.1"; 3.9 lbs.
- FCC Certified Class B; UL Listed.
- Complete ZEOS Customer Satisfaction Package.

PACKAGE 1

386SL Contenda: \$995

Lease \$42/month

- 2MB RAM
- 80MB IDE hard drive

486SL Contenda: \$1395

Lease \$59/month

- 4MB RAM
- 80MB IDE hard drive

PACKAGE 2

386SL Contenda: \$1295

Lease \$55/month

486SL Contenda: \$1695

Lease \$61/month

- 4MB RAM
- 80MB IDE hard drive
- External 3.5" floppy drive
- MS-DOS 6.2, Windows for Workgroups 3.11, Lotus Organizer

PACKAGE 3

386SL Contenda: \$1595

Lease \$58/month

486SL Contenda: \$1995

Lease \$72/month

- 4MB RAM (386SL); 8MB RAM (486SL)
- 80MB IDE hard drive (386SL); 120MB IDE hard drive (486SL)
- External 3.5" floppy drive
- Custom nylon carrying case
- Extra battery
- Internal fax modem
- MS-DOS 6.2, Windows for Workgroups 3.11, Lotus Organizer

plenty of power to run Windows. You'll also find you can work longer because the processor is intelligent enough to power-down the memory, disks, modem and more when they're not in use. In addition, the compact package includes a built-in trackball and high-resolution backlit screen.



Computer Shopper
readers' #1 Best Buy

It's a traveler's dream come true: The world at your fingertips in a mighty and tiny portable bundle. Don't get caught without it!

AWARD-WINNING SERVICE

ZEOS has won more *PC Magazine* Readers' Choice for Service & Reliability awards than any other company—five in all!

**CALL NOW TOLL FREE
800-554-7172
24 HOURS A DAY**

Fax Orders: 800-362-1205 or 612-362-1206; Government: 800-245-2449; Outside U.S. and Canada: 612-362-1212. Purchase Orders, MasterCard, VISA, Discover, Am Ex, Z-Card, COD and affordable leasing programs. Open 24 Hours a Day, 365 Days a Year!



and warranty details. Prices do not include shipping. All products and company names are trademarks or registered trademarks of their respective holders. ZEOS and Contenda are registered trademarks; Z-Card and Computers Now! are registered trademarks of ZEOS. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS). FSSN-PCM-9406A

CIRCLE 083 ON READER SERVICE CARD

HANDWRITER VERSION ALSO
AVAILABLE FOR DOS AND MAC

CIC's New Handwriter® Includes YPad:™ The Electronic Note-Taker

THE "BEST IN PEN COMPUTING" JUST KEEPS GETTING BETTER AND FASTER

YPAD IS FOR WHAT YOU DO MOST OFTEN

YPad furthers the spectacular success of Handwriter® for Windows, the all-in-one input device for entering graphics, text and commands that's compatible with all your applications.

We now introduce and include our **NEW** YPad note-taker with our ultra-light/ultra-thin tablet, cordless electronic pen and recognition software for your desktop computer. Also included is our **NEW** Handwriter Recognition System version 4.0, **NEW** SVGA support and **NEW** mouse-replacement driver for DOS. And as an incentive for you to take us up on our satisfaction-or-your-money-back offer, this \$600 value can be yours for an S.R.P. of only \$399.

THE ULTIMATE EDITING TOOL

Gestures are special pen strokes that perform specific editing functions, such as the cut gesture for deleting selected text.

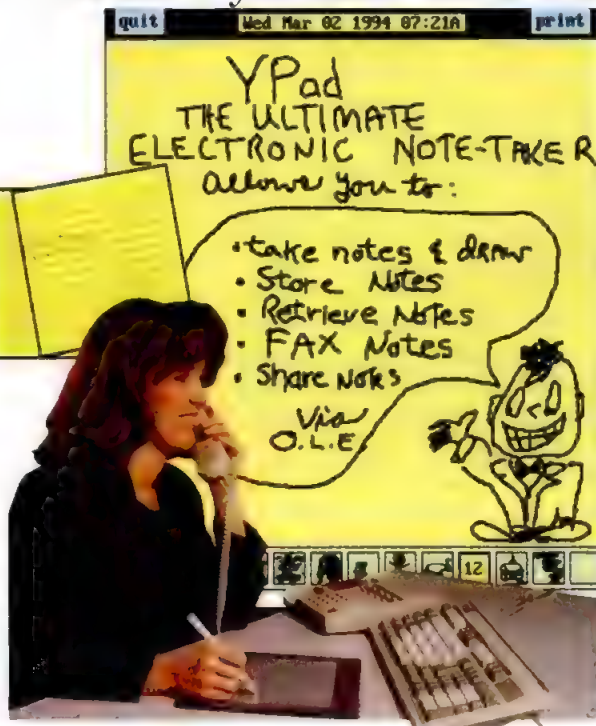
Gestures are special pen strokes that perform specific editing functions.

You spend at least 80% of your document-creating time editing. Highlighting, changing words with gestures you already know, moving text, spellchecking, pointing and clicking will make your pen the ultimate keyboard complement.

THE ULTIMATE PHYSICAL THERAPIST

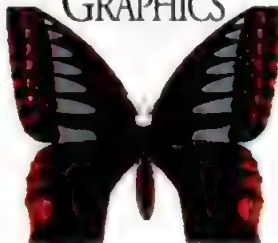


Tired of hurting, sitting in a rigid, cramped position using the mouse? Are



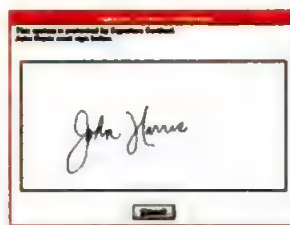
you really getting paid enough to suffer? 56% of all OSHA reported injuries are RSI, or Repetitive Stress Injuries. The recommended physical therapy for wrist and tendon problems is making a fist. Kind of like you'd do holding a pen. Pen computing is a very healthy complement to your computer keyboard. And to your life.

ULTIMATE GRAPHICS



Michelangelo didn't create his Sistine Chapel masterpiece with a ball peen hammer. Why constrain your own creativity with a mouse? Handwriter lets you draw or trace with ease and works perfectly with your graphics software.

ULTIMATE SECURITY: YOUR SIGNATURE



Why try to remember all those different passwords — and changing them periodically — when Handwriter for Windows comes with signature-verification security built into a screen saver? People may try to trace your signature, but it's virtually impossible for them to duplicate the stroke dynamics you used to write it. Signature-verification security makes a Handwriter the ultimate complement to your keyboard, especially in environments where many people have potential access to work areas.

"... and its handwriting recognition is the best we've ever seen."
March 1994, PC COMPUTING

COMPANIES OFFERING CIC RECOGNITION TECHNOLOGY:

Apple/Japan	NEC
AT&T	Samsung
Dauphin	Seiko Epson
Fujitsu	Symbol Tech.
IBM	Toshiba
MicroSlate	and others

Our previous version is a worldwide bestseller. CIC now includes the new Handwriter Recognizer version 4.0, which is more robust, faster, and allows natural writing.

Handwriter® VERSION 1.5 INCLUDES:

NEW YPad note-taker, **NEW** Handwriter Recognition System software, **NEW** SVGA support, **NEW** mouse-replacement driver for DOS, Microsoft Pen Extensions for Windows, a screen saver with Signature Verification, Crossword puzzles (and a way to get more), an ultra-thin/ultra-light tablet that plugs into your serial port, and a cordless electronic pen. Priced separately, YPad and the new Handwriter for Windows are an outstanding value at \$600. But to encourage you to order ...

**THIS \$600 VALUE
HAS A SUGGESTED
PRICE OF \$399
FROM YOUR
COMPUTER
DEALER OR
DIRECT FROM CIC**

Call 800-888-9242 ext 5021
415-802-7888 from outside the U.S.
Or FAX 415-802-7777

Communication Intelligence Corporation
CIC NASDAQ/NMS CICI

First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

■ More than a PIM

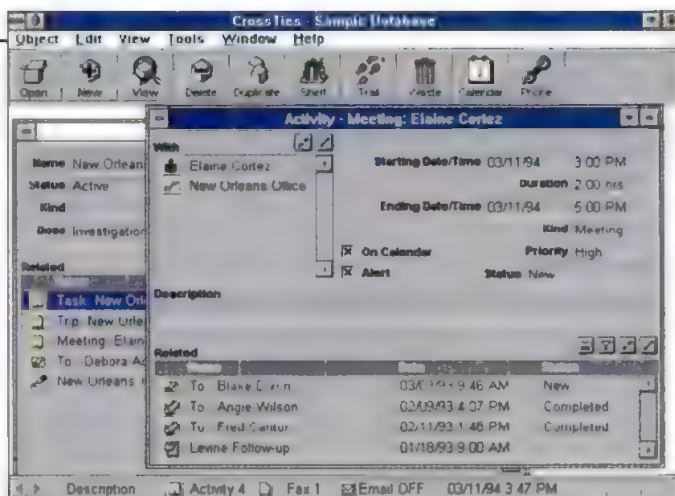
CrossTies Objectifies Personal Information Management

BY KATHY YAKAL

As this issue's evaluation of 14 personal information managers ("P Is for Personal") suggests, everyone should use a PIM, but no two people should necessarily use the *same* one. You'll find that there are a lot of available PIMs, each one with different strengths and weaknesses. But they all share a common goal: to

help you organize your information. So finding the right PIM means finding one that will accommodate your individual style of work, whatever that style may be.

One of the newest and most flexible contenders in this crowded category is CrossTies Software Corp.'s CrossTies for Windows (\$149.95). By taking an innovative but still straight-



PIM TOOLS: Link meetings and tasks to related objects.

forward approach to objectifying bits of information, the CrossTies program is as unobtrusive or as all-inclusive as you want it to be.

OBJECTIFY ME

At the heart of CrossTies is its InfoTies technology, which lets you represent all of your data—addresses, people, tasks, and even other applications—as objects. To get the most out of the program, you organize and link related objects of all kinds.

You start with a group of default objects: Activity, E-mail (the program is both MAPI- and VIM-compliant), Fax (you must use FaxWorks or FaxWorks Pro), Folder, Windows Notepad, Paintbrush, Person, Program, Project, or Windows Write file.

Individual objects contain information about a single person, task, or document, and you link any object to any other simply by clicking the link button. In this way you can make group objects, which comprise individual objects sharing common information or pertaining to particular tasks.

When you click on the Mrs. Sally Smith object, for example, all the information (appointments, projects, documents) related to Mrs. Smith is accessible.

Continues on page 38

■ Seeing Presentations in a New Light

IntelliMedia and Proxima Projectors Can Put on a Good Road Show

BY ALFRED POOR

Business presentations used to be so easy. You'd just grab a binder of overhead transparencies or a carousel of 35-mm slides and hit the road. Now, desktop multimedia has raised presenters' abilities and audiences' expectations to the point where you need at least some movement on the screen and some sound other than the presenter's voice to make an impressive impact.

There are dozens of convoluted ways to get multimedia up on a big screen, but more often than not they leave you struggling with a high-tech octopus as you try to sort out the connec-

tions from speakers to laptop to projection panel to monitor to VCR, not to mention the mouse and the power strip.

Two new high-end projection products from IntelliMedia and Proxima seek to simplify the sit-

Continues on page 39



INTELLIMEDIA: The DPS-I has a built-in 486-based PC.

► IN FIRST LOOKS

Intel ProShare	40	CoSession for Windows.....	48
Compaq Contura Aero.....	42	Golden CommPass 2.1	48
Video Compression		The Baarns Utilities 5.....	50
Sampler.....	42	Braincel 2.0.....	50
The Norton Utilities 8.0.....	44	ImagePals 2.....	52
LANtastic 6.0.....	46	WordPerfect 5.1+	
Dell Latitude 433C.....	46	for DOS.....	54
NEC MultiSync		CompuServe Navigator,	
Multimedia Monitor	47	Windows Version 1.0	54
Number Nine #9GXE64.....	47	IntelliDraw 2.0.....	56

First Looks

CrossTies

CONTINUED FROM PAGE 37

ble in other objects you've linked to her. If Mrs. Smith and Mr. Jones are working on the same task, you can connect both of them to the same project object, which can contain all the relevant document objects. An unlink icon breaks object connections you no longer need.

To simplify data entry in the fields that hide behind object icons, you can devise templates containing often-repeated information. For example, you could create a template containing shared company name and address information so you'd only have to enter employees' names and phone numbers.

You can use filtered templates to search for common characteristics, searching for, say, all travel agents in your database, while manual templates require manual links between objects that don't share identical common characteristics.

DESKTOP MANAGER, TOO

Serious CrossTies users can even use the program as a Windows shell that replaces the Program Manager. By making objects out of files used by other programs and linking them to pertinent groups, you can access them at any time. You can also launch any Windows application from within CrossTies or use the program's built-in viewer to see a file without launching the application.

When you first open your database, your Windows program groups appear on the Shelf, but you can link other objects to it and launch other Windows applications directly from there (or from a Program object). The Trail function posts up to 100 icons representing the most recent objects you've accessed, and you can arrange icons on the Shelf for your most frequently used objects.

CrossTies lets you send or receive faxes and e-mail. The

same filters used to strain objects let you filter e-mail by sender or recipient, priority, or common linked object. Filters can also generate lists of all activities with a particular status (pending, completed), starting date or range of dates, or activities linked to common objects. Macros for automating frequent functions are easy to record.

Further, when you install CrossTies, a little blue cube is placed in the upper left corner of every Windows app. Click on this switch box and you'll see a list of every application that's currently running; click on an app and you'll go to it.

INFORMATION GATHERING

CrossTies imports more formats than most PIMs do, though it offers no mapping feature to help rearrange field order. If you import a straight ASCII or dBASE file, you'll have to massage your database first to get it

only took about a minute on a 486 system.

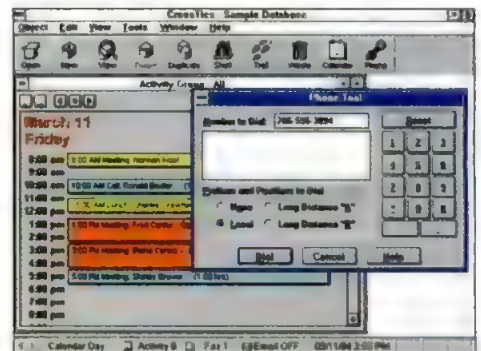
If you have a lot of extraneous information in your contact database, you may have trouble squeezing it all into the Person screens. CrossTies' Person object splits 30 predefined fields among two different screens, the first for primary information like name, address, fax and phone numbers, and the second for an alternate address, additional phone numbers, one e-mail address, and

classifications like type, status, and department. No user-defined fields are available.

TAKING OUT THE TRASH

The program takes unusual care with data deletion and disk

CrossTies' calendaring function is equivalent to that of today's best PIMs. Phone calls, meetings, to-do lists, and other activities are set up like any other object in the program.



REMINDER: You can auto-dial when a phone call alert reminds you to make a call.

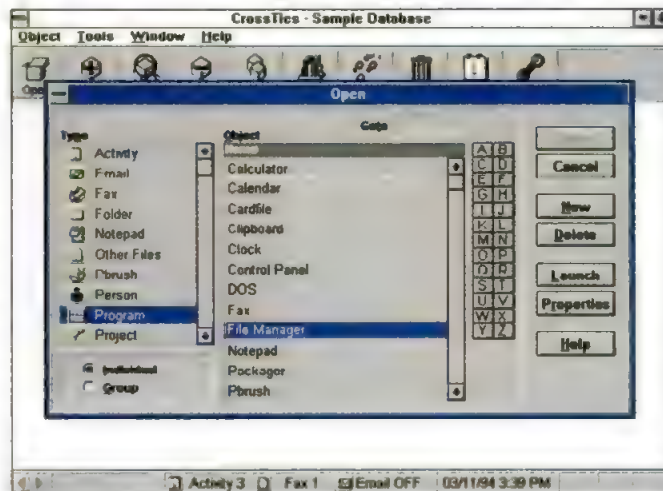
You click on New, then Activity, then define the event by working your way through the dialog box using pop-up data-entry aids where available. You can choose whether or not the event should appear on the calendar and you can set an alert, prioritize, link the activity to another object, and schedule group activities, but you can't designate recurring activities.

Drag-and-drop—and drag-and-stretch, which uses the mouse to change an activity's duration—simplifies the editing of graphical calendars. You can print daily, weekly, and monthly calendars in Day-Timer and other page formats.

There's nothing difficult about using CrossTies. Its screens are clean and uncluttered, and you're helped along with pop-up lists, intuitive icons, and context-sensitive help. CrossTies is a new breed of information manager that takes a unique, less structured approach that will appeal even to the truly PIM-phobic.

• List price: *CrossTies for Windows*, \$149.95. Requires: 4MB RAM, 11MB hard disk space, Microsoft Windows 3.1. CrossTies Software Corp., 2445 Midway Rd., #200, Carrollton, TX 75006; 800-955-8437, 214-407-9996; fax, 214-407-9215.

Circle 424 on reader service card



OBJECTIFIED: Click on an object on the left, and the corresponding objects within are listed on the right.

in the right order. But if you do a direct import from any of the formats supported—ACT!, Commence, Ecco, Organizer, or PackRat—CrossTies will walk you through the import process, explaining, where necessary, how to export from the other program first. We did a direct import of a 1,000-record database from both ACT! and Organizer, and the operation

maintenance. Deleted files go into the wastebasket and remain there until you go in and delete them or empty the wastebasket. The Maintenance function, which is recommended for use if you have been deleting a lot of files or see an unknown object linked to another, compresses the program's database and removes all unknown objects.

IntelliMedia

CONTINUED FROM PAGE 37

uation by integrating multiple functions in a single housing. While both companies take different paths, the destination—effective multimedia road shows—is the same.

INTELLIVIEW DPS-I

IntelliMedia's \$5,995 IntelliView DPS-I LCD projector doesn't include its own light source (you have to use it with an overhead projector), but it does include a computer.

At 2.6 by 15.7 by 12.8 inches (HWD), the unit is slightly larger than most LCD panels for overhead projectors, but at 8 pounds, it's only slightly heavier than a typical notebook PC. IntelliMedia has managed to shoehorn a lot of technology into this small package.

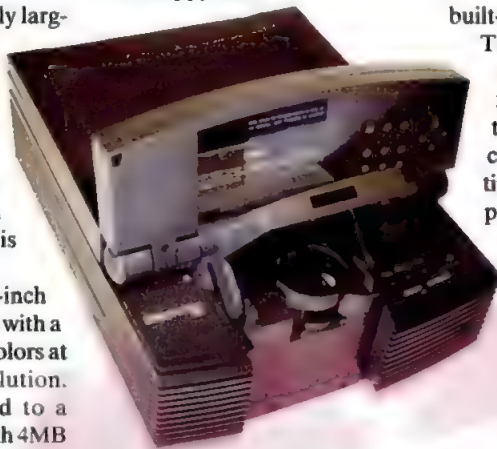
First, you have an 8.4-inch active-matrix LCD panel with a palette of up to 185,193 colors at 640-by-480 (VGA) resolution. The display is attached to a 486SLC-based system with 4MB of RAM (upgradable to 16MB), local-bus video, stereo digital sound, a 120MB hard disk, and a 1.44MB floppy disk drive, all in the same housing. The computer comes with DOS, Windows, and some presentation utilities preinstalled. The only thing missing is a keyboard.

The IntelliView also has stereo sound input and output connectors so you can use external speakers to get true stereo sound. The included internal speakers produce a nonstereo mix of left and right channel signals.

The result is a complete presentation system that's ready to run right out of the box. All you need to do is place it on an overhead projector and plug in the power. (For best results, IntelliMedia recommends a projector with at least 4,000 lumens of light output.) There's even an infrared remote control that lets

you run most programs without a keyboard, providing mouse movements and Enter and Escape key functions.

The software includes a launching utility that makes it relatively easy to locate and start a prepared multimedia presentation. While the system doesn't include any presentation authoring software, it does come with runtime drivers for many popular programs including PowerPoint, Freelance Graphics, Harvard Graphics, and Super Show and Tell. You create the presentation on another computer, then transfer it to the IntelliView on a floppy disk.



PROXIMA: The \$8,995 Desktop Projector 2800 can put on a show for 300 people.

The system is designed to be easy for noncomputer users to handle, but there are ports for a keyboard, mouse, and external VGA monitor as well as parallel and serial ports, so power users can take full advantage of the unit's built-in computer while on the road.

IntelliMedia also offers a \$995 upgrade that adds support for composite video signals (NTSC, S-Video, PAL, and SECAM), a PCMCIA slot, and a SCSI port for an external CD-ROM drive.

Even without this upgrade, however, the IntelliView packs a lot of power in a small and attractive package. This could become the multimedia equivalent of a 35-mm slide projector

for traveling presentations.

• List price: *IntelliView DPS-I*, \$5,995; *digital video, PCMCIA, and SCSI expansion card*, \$995. *IntelliMedia Corp.*, 455 River-view Dr., Benton Harbor, MI 49022; 800-706-0077, 616-925-3675; fax, 616-925-3668.

Circle 425 on reader service card

PROXIMA'S DESKTOP PROJECTOR 2800

Proxima's Desktop Projector 2800 has a breathtaking \$8,995 list price. What you're paying for is the quality of the projected image because, unlike the IntelliMedia model, Proxima's Desk top projector 2800 has no built-in computer.

The DP2800 is about 6 inches high, a foot wide and a foot and a half long, not that much larger than a carousel slide projector. It tips the scales at just under 20 pounds, which is still light enough to consider the unit transportable.

The case houses a 410-watt halogen light-projection system (with a quick-change spare bulb included), which shines through a 640-by-480 active-matrix LCD panel. The bright light source and "folded" optics result in a compact design with a rated image brightness

of 110 lumens. According to Proxima, the resulting image is suitable for audiences as large as 300 people. The case has a clever design, with two hinged panels that completely protect the projection lens and mirror from dust and damage when not in use.

The active-matrix LCD panel provides more simultaneous colors than a passive-matrix panel: up to 2 million simultaneous colors out of a possible 16.7 million. A feature called Active Color Enhancement optimizes palette selection. The images were excellent during our testing, with very slight posterization of continuous tones (such as photographs of faces) that would be noticed only by the most critical of observers.

The projector accepts VGA signals from a computer, as well as NTSC, S-Video, PAL, and SECAM video signals. The built-in 3-watt-per-channel stereo sound system has separate pairs of inputs for either computer audio or from an external source, as well as audio-out connections. All connectors are clearly marked and conveniently located on the back of the projector.

There's also a connector for a computer serial port to take advantage of Proxima's optional Cyclops pointing device. This clever gadget lets you control Windows programs (and a few DOS programs) using light pointed at the projection screen instead of a mouse.

You can use either the wand pointer that comes with the \$495 Cyclops upgrade or a pen-size laser for \$295. With a little practice, you can perform all mouse actions—including double-clicks—up to 20 feet away from the screen. While the Cyclops is designed for most overhead projector panels as a separate unit, the DP2800's Cyclops fits neatly inside the case as an unobtrusive and permanent feature.

The price of the DP2800 is reasonable when you consider the alternatives. The DP2800 is more convenient than typical overhead projector panels, especially when you take into account its all-in-one design. Moreover, it's far easier to transport and set up than expensive table-size data projectors based on CRT-technology, and its image quality is nearly as good. If you need a one-piece solution for video and graphics projection, the Proxima Desktop Projector 2800 is a bright idea.

• List price: *Desktop Projector 2800*, \$8,995; *Cyclops option with wand*, \$495; *laser pointer*, \$295; *soft carrying case*, \$189.95; *hard carrying case*, \$399.95. *Proxima Corp.*, 9440 Carroll Park Dr., San Diego, CA 92121-2298; 800-447-7694, 619-457-5500; fax, 619-457-9647.

Circle 426 on reader service card

■ Video Conferencing

Video System 200: Pictures Worth a Thousand Words

BY JOHN R. QUAIN

The next-best thing to being there just got better. Until now, computer-based video conferencing has been too expensive (costing \$10,000 or more) and difficult to use. The Intel ProShare Personal Conferencing Video System 200 is the first to offer acceptable desktop one-to-one video conferencing in an easy-to-use, affordable add-on package. List priced at \$2,499 but available through resellers and phone companies for \$1,000 to \$1,500, the Video System 200 costs about the same as a mid-week, round-trip plane ticket from New York to San Francisco. So now even small businesses can justify the price.

The Video System 200 includes two 16-bit ISA boards (a video digitizing board for the camera and an ISDN board with audio), a paperback-size camera with a swivel stand that attaches to your monitor, a combination earphone/microphone, and Windows software. You can substitute a camcorder for Intel's camera, and the system will also accommodate external speakers and a microphone if you find the single-ear speaker/microphone irritating.

SEE THE OTHER SIDE

Initially, using the Video System 200 feels a little like you're communicating with astronauts on the Space Shuttle. Although the audio is continuous, the picture can skip when the person on the other end moves suddenly. You won't see full-motion, 24-frame-per-second (fps) video, but the system's 8 to 15 fps rate is realistic enough for business use.

The camera has a shutter door for privacy and gives you only two views: a close-up or a

wide shot. The software lets you switch between the two, but the system is tailored for person-to-person video calls, not for group meetings.

Another limitation is that you can only view the incoming and outgoing video in either a 160- by 120-pixel or a 320- by 240-pixel window. Choosing the larger size means sacrificing image detail, but the system's color accuracy is quite good. When lighting conditions are less than optimal, the software allows you to adjust the brightness, contrast, saturation, and tint of the video images.

The Video System 200 is based on Intel's own Indeo codec (compression/decompression algorithm), which compresses the outgoing video in

dollars more. Furthermore, Intel's system is by far the easiest to use. A graphical dialing pad stores numbers for speed dialing, and a supplied address book can even store screen captures of callers.

The ProShare part of the Video System 200 is whiteboard software, which lets you and the caller work on the same document simultaneously (a \$99 ProShare-only package will run on NetWare 3.11 and 4.x). The program supports OLE (Object Linking and Embedding), so spreadsheets and reports can be updated.

Using ProShare in conjunction with video does degrade performance while files are transferred, but the continuous audio makes the momentary video gap

isn't available everywhere. Most Regional Bell Operating Companies (RBOCs) are still in the midst of replacing older analog switches with digital ISDN equipment, but coverage is rapidly expanding. A typical ISDN PC hookup gives you three channels: two 64-Kbps channels and one 16-Kbps channel (versus 14.4 Kbps on an analog phone line). Installation can cost up to \$150, and monthly service ranges from \$16 to \$40.

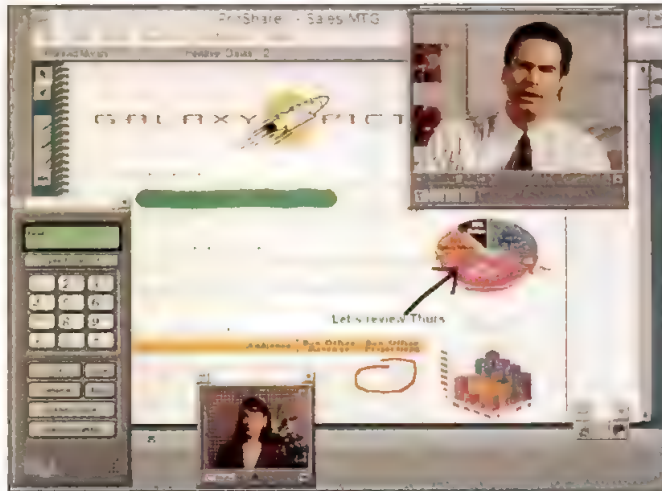
Installing the Video System 200 itself is straightforward, but setting up the ISDN line is not. Few phone companies are conversant in the technology, and some issues, such as who provides the NT-1 (Network Termination-1) box that turns the incoming two-line wire into a four-line wire for the PC, have not been resolved. (Intel's system does not come with an NT-1 box, so make sure the phone company supplies one.)

The largest disadvantage is the absence of standards that would allow the various video phones to talk to one another. Telecommunications standards like H.320 and H.261 are incompatible with newer PC-based codecs like Indeo. A few companies are working on Indeo support, but if you want to talk to other people using the Video System 200 now, they'll need to have one as well.

In spite of the limitations, most businesses will immediately see the benefits of the Video System 200. The improved communications and the ability to work face to face on the same document with coworkers thousands of miles away are advantages that few products can offer at any price.

- List price: *Intel ProShare Personal Conferencing Video System 200*, \$2,499. Requires: 486/33-based PC or better, 8MB RAM, 7MB hard disk space, Microsoft Windows 3.1. Intel Corp., 2200 Mission College Blvd., P.O. Box 58119, Santa Clara, CA 95052; 800-538-3373, 503-629-7000; fax, 800-458-6231.

Circle 433 on reader service card



WAVE HELLO: Intel's video conferencing costs \$2,499.

hardware but decompresses incoming signals in software. Consequently, a Pentium-based PC offers the best results, although a 486DX/66 proved adequate.

While other systems (such as those from PictureTel and AT&T) offer better video quality, they cost several thousand

acceptable. Unfortunately, full application sharing won't be available until the spring.

COMMUNICATION GAP

One drawback is that the Video System 200 requires an ISDN (Integrated Services Digital Network) phone line, and, unfortunately, ISDN service

Pixels per second

1,600,000

1,400,000

1,200,000

1,000,000

800,000

600,000

400,000

200,000

0

Close-Up 5.0

pcAnywhere
for Windows 1.0

CarbonCopy
for Windows 2.0

WinBench scores
(average of 10 runs):
Close-Up 1,613,118
pcAnywhere 194,093
CarbonCopy 168,397

WinBench™ 3.11 by Ziff-Davis Labs Tests Remote Windows™ Speed

This graph shows the speed of the three leading remote control programs when transferring Windows screens. As you can see, Close-Up handles more pixels, faster, meaning you spend less time waiting for Windows screens.

The industry standard test, WinBench 3.11, is perfect for testing the speed of remotes. It is an accurate measure of video throughput. Video throughput is the limiting factor in remote operations, because remote programs must transmit Windows video functions from one PC to the other.

Communicate Faster & Easier

Close-Up® lets you communicate faster & easier with five exciting technology firsts.

Close-Up is the only remote communications software that won both PC Magazine's coveted "Editors Choice" and PC World's "Best Buy" awards. Now Close-Up has a new faster & easier version that allows you to view and control another PC by modem as if you were there!

Technology Firsts

1. AI Video Compression
2. Photographic Memory
3. Non-Intrusive Technology
4. Expert System
5. Video Translation

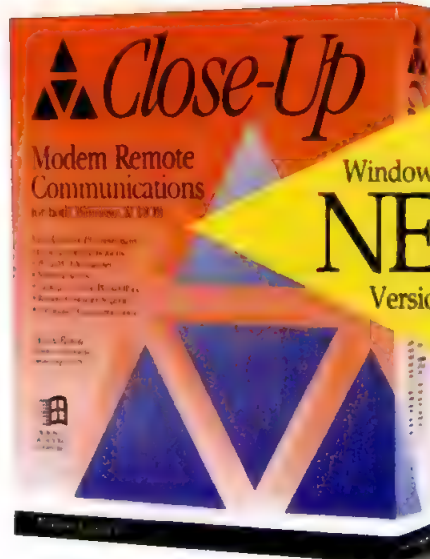
Why Is Close-Up So Fast?

Close-Up learns as it works. It uses AI (Artificial Intelligence) to compress all Windows video function calls. That's why Close-Up does so well in Windows

a Windows screen, it's memorized. Then as screens change, Close-Up only transmits new unmemorized data. Incredibly, with this technology Close-Up gets faster & faster the longer you use it.

What Remote Companies Haven't Told You

Other remote programs permanently slow Windows and usually reduce your video resolution and depth of color, even when they are not in memory. That's because they permanently change your system.ini file. Close-Up's breakthrough Non-Intrusive Technology does not modify any of your sensitive Windows files including the system.ini. Close-Up is the only remote that when not in use, allows Windows and your PC to run at normal optimal levels.



For Both
Windows & DOS
NEW
Version 5.0

New Remote Software Sets Windows Speed Record

Expert System Makes Communications Easy

You don't have to be a communications expert to get the results of one. Close-Up has an Expert System that automatically analyzes system components and configures your system for optimal speed.

Video Translation

With Close-Up, dissimilar PCs can easily connect, because Close-Up senses the video capabilities of both PCs and automatically displays Windows in a video mode compatible with both sides.

Risk-Free Offer!

Try Close-Up. If you're not absolutely convinced that Close-Up 5.0 is the fastest remote program, we'll give you your money back!*

Order Close-Up Host & Remote, a complete system, for only \$199.⁹⁵

Upgrade your current or competitive remote program to new Close-Up 5.0. Get both sides, Host & Remote, for only \$69.⁹⁵

Order Today 805-964-6767

Norton-Lambert

We invite you to reproduce this test. We used two identical Gateway 4DX2-66V's with 66-MHz Intel 486DX2-66 CPUs, 16 MB RAM, 256KB RAM cache, 340 MB HD, IDE controller, no hardware disk cache. Video: Local Bus ATI Ultra Pro with 2MB VRAM, 640 by 480 pixels, 16 colors, VGA.DRV dated 3/10/92. Monitor 72 Hz. MS-DOS 5.0. SMARTDRV 2 MB cache. Modems: two 14,400 baud V.32bis. Test performed without verification by ZiF. All products are shipping versions. WinBench trademark of Ziff Communications Co. Windows trademark of Microsoft Corp.

*60 day money-back guarantee if purchased directly from Norton-Lambert. Offer expires 6/30/94. All prices in US Dollars. Prices exclude shipping.
© 1994 Norton-Lambert Corp., P.O. Box 4085, Santa Barbara, CA 93140 USA Phone (805) 964-6767 Fax (805) 683-5679

CIRCLE 346 ON READER SERVICE CARD

■ DOS Utilities

Video Compression Sampler Helps Cope with Codecs

BY JOHN R. QUAIN

Anyone working with full-motion video files can use Doceo Software's \$49 Video Compression Sampler (VCS) to analyze the compression of the full-motion video they plan to include in multimedia presentations, training applications, or CD-ROM-based software.

With over 250 .AVI-format video clips on a single CD-ROM, VCS is a valuable guide to the relative benefits and drawbacks of five software compression/decompression algorithms (codecs): Video 1 (8- and 16-bit), Cinepak, Indeo 3.1, RLE, and MPEG.

The VCS Play utility gives you an on-screen side-by-side comparison of different .AVI files using different codecs, resolutions, color depths, and compression parameters. You can zoom in or out on a particular frame to examine the tradeoffs that each codec makes in terms of color fidelity and image detail.

VCS also offers detailed .AVI file information, including the number of video frames, the compression format, palette changes, average frame size,

audio format, and the number of key frames. In addition, a Video Performance Meter informs you of the number of audio breaks that occurred during playback on your own system.

If you're developing applications, you need to know how your files will play back on someone else's CD-ROM drive. For that, VCS provides a Frame Profile utility that uses a bar graph to indicate the data-transfer requirements of individual files. It helps you judge whether a particular clip will play back smoothly on a single- or double-speed CD-ROM drive.

VCS includes a runtime version of Microsoft's Video for Windows 1.1. Those who already have Version 1.0 will get the latest Cinepak and Indeo 3.1 codecs added to their software. And the CD-ROM contains an on-line help file that covers many of the compression basics. Unfortunately, a printed manual is not part of the package. Although it's a minor omission, users may miss it since the program occasionally ignores some Windows conventions (such as close options on some of the dialog boxes). Once you become

accustomed to VCS's maneuvers, however, you'll appreciate its shortcuts.

Developers who work with video clips and create software for CD-ROM applications will find the small investment for VCS well worthwhile.

• List price: *Video Compression*

Sampler, Version 1.01, \$49. Requires: 4MB RAM, 3MB hard disk space, DOS 5.0 or later, Microsoft Windows 3.1, CD-ROM drive. Doceo Publishing Inc., One Meca Way, Norcross, GA 30093; 404-876-8954, fax, 404-564-5528.

Circle 432 on reader service card

■ Notebook PCs

At \$1,399, Compaq's Aero Undercuts the Competition

BY DON WILLMOTT

1994 is already turning out to be a very good year for subnotebook PCs, those under-6-pound marvels of miniaturization. As *PC Magazine's* recent cover story ("Small Wonders," March 29, 1994) showed, performance of subnotebooks is rapidly improving while increasing competition keeps prices dropping.

Compaq is a little late to the game with the Contura Aero 4/25, but this well-designed, attractively priced system should have little trouble competing. At 3.5 pounds, the monochrome version is significantly lighter than the 4.1-pound monochrome version of the Toshiba Portege T3400 (which earned an Editors' Choice), but heavier than the 2.9-pound HP OmniBook 425. Its AC adapter is very light, too, weighing just 6 ounces. Measuring 1.5 by 10.25 by 7.5 inches (HWD), the Aero is about the same size as most of its competitors.

The 486SX/25-based Aero we tested came with an 8-inch-diagonal monochrome screen, 4MB of RAM, and an 84MB hard disk for the surprisingly low price of \$1,399. Though such pricing shows that Compaq is positioning the Aero as its mass-market contender, passive-matrix color models with larger

hard disks and 33-MHz processors are also available at prices ranging up to about \$2,499. No floppy disk drive is included; the optional 6-ounce drive connects via the

Aero's one Type II PCMCIA slot and draws power through it.

The Aero is notable for being the first subnotebook to use Duracell's new standard-size nickel hydride batteries. Duracell hopes to make such batteries ubi-

quitous in computer stores and hotels (for on-the-road emergencies). The battery did well on PC Labs' Battery Life test, keeping the Aero running for 4 hours 26 minutes.

Like most portable PCs, the Aero has a built-in pointing device, in this case a too-small trackball on the lower right-hand side of the keyboard. The keyboard itself isn't too crowded and is comfortable for typing.

Chances are, though, that the Aero will spend more time on the road than on your desk. Its excellent portability makes it a welcome traveling companion.

• List price: *Compaq Contura Aero 4/25, with 84MB hard disk, \$1,399; with 170MB hard disk, \$1,699. Compaq Computer Corp., P.O. Box 692000, M120208, Houston, TX 77269; 800-345-1518, 713-370-0670; fax, 713-378-1442.*

Circle 431 on reader service card



STYLISH SUBNOTEBOOK:

The Aero has a competitive advantage.



TV GUIDE: Video Compression Sampler tells you all about multimedia videos.

Fidelity Announces Our Best Deal Ever For Active Investors



Award-Winning Fidelity On-line XpressSM Is Now Just \$49.95

Last year, *PC/Computing* magazine described Fidelity On-line Xpress (FOX) as "a quantum leap in electronic investing." Previously \$89.95, this advanced software package is now available for just \$49.95!

With FOX investment software, your trading orders are sent to the marketplace in seconds and executed by Fidelity Brokerage. For stock and option trades you'll save an additional 10% on commissions that are already as much as 76% lower than full-cost brokers.¹ And now, when you buy FOX software at its new low price, **your first stock or option trade is free**, up to \$38.

- ***New lower price for FOX software***
- ***Your first trade free****
- ***30-day trial offer of Telescan***

A Complete Personal Financial Market Monitor

FOX software gives you a breadth of portfolio management features you simply won't find anywhere else, from tax lot tracking to instant research services. And starting now, Fidelity is also offering to FOX buyers a **30-day trial offer of The Telescan System**,² the advanced investment information service, with technical charting and fundamental analysis tools to help you screen and review a broad range of financial data. Maybe it's time to put FOX software and Fidelity Brokerage on your side in today's market. Call anytime to learn more.

**For More Information Call
1-800-544-9375**



*To be eligible for first FOX trade free up to \$38, software must be purchased by June 30, 1994, and your first trade must be made using FOX by September 30, 1994. FOX orders for your account(s) are sent directly to the markets via Fidelity's computer system, and are subject to trading and account requirements. Telephone charges may apply. FOX hardware requirements include an IBM or compatible system with hard disk drive, free space of at least 3 Mb, Hayes or compatible modem, 640k internal memory. Color graphics and mouse optional. The optional news and analysis services of Dow Jones News/Retrieval, Telescan and S&P MarketScope are available through FOX. FOX was jointly developed by MECA Software, Inc. and Fidelity Investments. ¹Based on October 1993 survey. ²For a one-time \$12.75 shipping charge, you get the Analyzer, ProSearch and Mutual Fund Search software, the complete set of user manuals and 30 days of free usage of Telescan during non-prime time hours (6:00 p.m. - 7:00 a.m., local time). Fidelity Brokerage Services, Inc., 161 Devonshire Street, Boston, MA 02110. Member NYSE/SIPC.

CODE: PC/051794

Utilities

The Norton Utilities 8.0 Adds Effective Windows Tools

BY EDWARD MENDELSON

Version 8.0 of The Norton Utilities is the first to add Windows utilities to Symantec Corp.'s classic DOS software. The new Windows programs in this \$179 package (\$49 for the upgrade) aren't indispensable data rescuers like the DOS programs, but they provide safety and convenience that you won't find elsewhere. The DOS-based utilities are generally identical to those in Version 7.0 and remain the best disk-repair and safety products on the market.

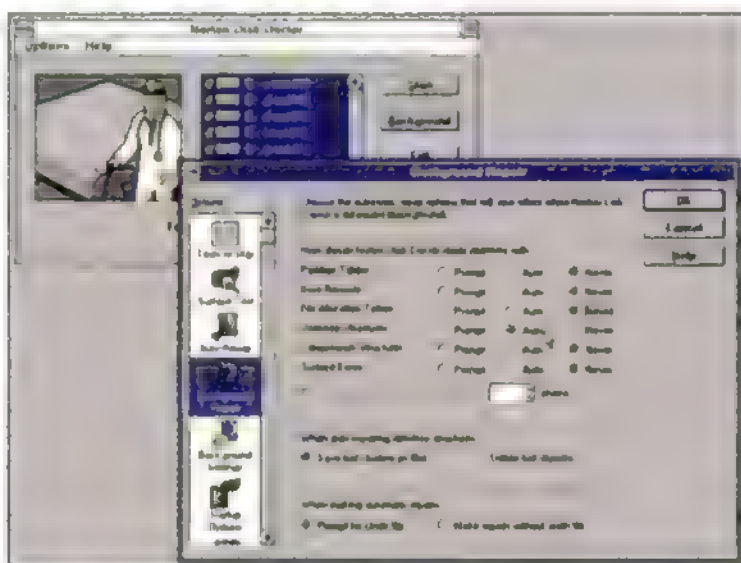
The Windows-based versions of Norton's Disk Doctor disk-repair utility and Norton's Speed Disk defragmenter are both based on earlier versions found in The Norton Desktop for Windows, Version 3.0. Both can now perform all their functions in the background. A new Windows system gauge reports memory and resource usage in more detail than any rival program, and a new set of complex, interlocking utilities helps tune and edit .INI files.

BETTER DIAGNOSTICS

The major change in Norton's DOS-based utilities is an enhanced hardware diagnostic that now equals or betters stand-alone diagnostic packages. On one test system, only Norton and The RenaSonce Group's InfoSpotter detected an IRQ (interrupt request) in use by an ESDI (enhanced small device interface) SCSI controller. All other diagnostics reported the IRQ as available for use by new hardware—a recipe for disaster.

Norton's classic DOS rescue

utilities include a new file-repair utility that now supports WordPerfect 6.0 files, a uniquely powerful disk editor, and the best unerase program available. If your hard disk won't boot and you don't have a DOS system disk, a supplied emergency disk lets you boot to make basic repairs.



AUTO-REPAIR: Disk Doctor for Windows can automatically fix directory structures.

USING MULTITASKING

These Windows utilities make better use of multitasking than any rival program. The Speed Disk defragmenter continues to work even while other programs read the disk. Unlike the defragmenter in PC Tools for Windows, Speed Disk won't shut down if you write to a different partition, although it stops and automatically restarts if you write to the partition that's being defragmented. It isn't fazed by disk reads performed by other applications, and it has the unique ability to defragment files that are open.

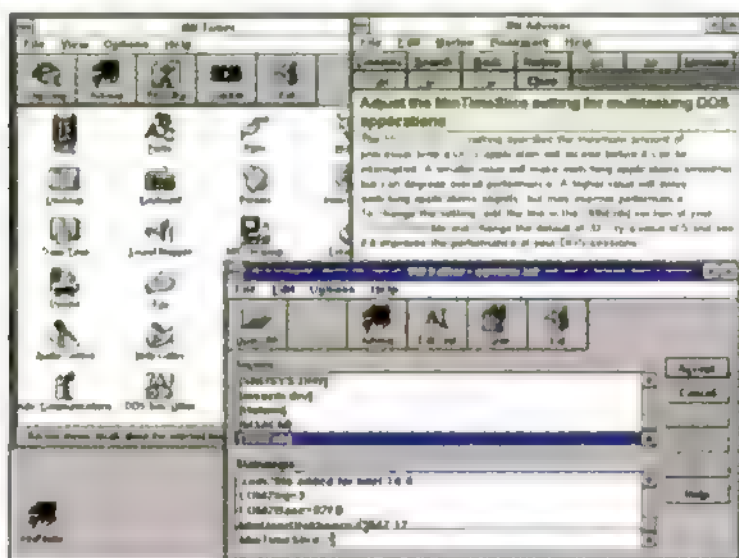
Unlike PC Tools' DiskFix, Norton's Disk Doctor can test directory structures and disk surfaces while you run other applications. Although background disk testing probably isn't worth

the slowdown imposed on foreground applications, you may want to try it if you suspect that your disk is unreliable.

Norton's Windows System Watch resource gauge uses bar charts to display Windows resources, three different measures of available memory, file handles, open files, disk space,

and less useful measurements such as CPU utilization. Norton's Windows System Watch isn't as visually appealing as PC Tools' CrashGuard, but it tells you more about your system.

The four interlocking .INI utilities track changes to Windows- and system-initialization files. You can compare the current state of .INI files with earlier states and restore individual settings or whole files. An .INI adviser offers advice on settings in WIN.INI and SYSTEM.INI.



.INI ADVISOR: Norton's .INI editing system is complex but full of information.

Unlike SoftLogic Solutions' WinSense or PC Tools' System Consultant, Norton doesn't examine your system and offer specific suggestions. Instead, you have to browse through every setting you may be interested in and decide what to do

with the general advice in the help file. This advice is mostly reliable, but like all other .INI adviser software, it sometimes reproduces erroneous or explanations from Microsoft Windows Resource Kit.

WORKING WITH COMPRESSION

All the Norton tuning and repair programs can operate on compressed drives that are created by DoubleSpace, SuperStor PRO, and Stacker 2.0 through 3.1—more kinds than any other disk utilities. However, Norton makes no attempt to defragment or repair compressed drives created by Stacker 4.0, the first compression software that ignores disk-sector boundaries. You can use Norton to repair the host drive of a Stacker 4.0 drive but not the structure of the Stacker drive.

A few glitches remain from earlier versions of the DOS utilities. If you use the configuration menu to change the names of some of Norton's programs, they won't be copied to Norton-created rescue disks unless you edit an .INI file by hand. And the installation program creates Windows icons even for DOS utilities that you didn't install.

Don't look in The Norton Utilities for Windows for desktop features like those found in

PC Tools for Windows or in The Norton Desktop for Windows. If you're happy with Version 7.0 of The Norton Utilities, Version 8.0 isn't an essential upgrade. But despite some rough edges, Norton's new Windows utilities can assure safer and more reliable computing than anything else on the market.

• List price: The Norton Utilities, Version 8.0, \$179; upgrade, \$49. Requires: 640K RAM, 8MB hard disk space, DOS 3.3 or later, Microsoft Windows 3.1 for Windows utilities. Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014; 800-441-7234, 503-334-6054; fax, 503-334-7474.

Circle 430 on reader service card

HIGH-TECH, HIGH-FASHION MONITORS, FOR THE ECOLOGICALLY MINDED.



- **Award-winning Color Monitors**
from 14", 15" FST and
17" FST MicroScan™ series.
- **Razor Sharp High Resolution**
from VGA, SVGA, and VESA
modes up to 1280x1024NI.
- **Non-interlaced Scanning**
excellent image quality reducing
eyestrain and fatigue.
- **72-100 Hz Refresh Rate**
easy-on-the-eyes super flicker-
free display.
- **Full Screen Display**
15-30% more edge-to-edge on-
screen display real estate.
- **Microprocessor Intelligence**
full range of dynamic display
compatibility.
- **Front Panel Digital Controls**
easy adjustments for picture size,
position and geometry.

For more information call
800-228-0530.
For faxed product information
and editorial review dial
800-767-8182.



■ Peer-to-Peer Networking

LANtastic 6.0 Adds E-Mail And Group Scheduling

BY STEVE RIGNEY

Artisoft's \$119 LANtastic 6.0, a complete rewrite of the popular peer-to-peer network operating system, can handle the needs of both small and large networks. The line between low-overhead peer-to-peer LANs and client/server networks has never been blurrier.

LANtastic's new e-mail and scheduling are real attention grabbers. Artisoft Exchange Mail lets you send and receive e-mail and binary attachments across your LAN or WAN. This Windows-based app handles multiple address lists, personal and group folders, network faxing, and gateway support. You can use Artisoft Mail to send personal or group electronic messages or faxes to anyone on your LAN or WAN using a host of different e-mail gateways, including MHS. A DOS version of the program will be included in LANtastic's next release.

The Windows-based Artisoft Exchange Scheduler manages personal or group appointments and meetings. It's useful for reminding yourself of important meetings or for checking the availability of your colleagues for a group meeting. Unfortunately, it doesn't alert you to schedule conflicts or offer alternate dates and times.

More important from an infrastructural perspective, however, LANtastic now comes with the software you need in order to interact with a NetWare server. It uses Novell's NetWare Core Protocol (NCP) as well as IPX and Windows servers like Windows for Workgroups and Windows NT using the Server Message Block (SMB) protocol over NetBEUI. LANtastic is the only peer-based network that can connect to LANtastic, Windows, and NetWare servers

using a single redirector.

LANtastic's burst-mode network transfer feature lets you send more data with less overhead and achieve better performance. The internal file-sharing utility replaces the standard

DOS Share program and offers better file and record locking on your LANtastic server. With its modular server, LANtastic loads only the modules that you need on your network. The result is more available conventional memory.

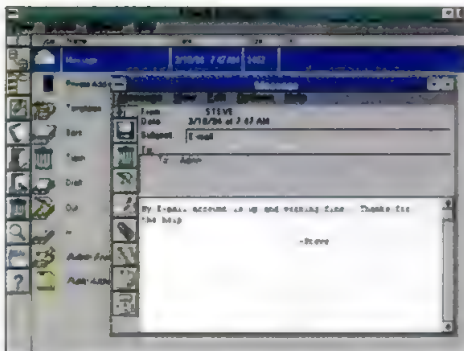
Like Windows

for Workgroups, LANtastic supports network DDE, which helps you share data dynamically over the network. Two or more users can simultaneously link information into a single Windows app and make changes on the fly.

LANtastic 6.0 insures that your network will connect with everything and that you'll have plenty of room for growth.

•List price: LANtastic 6.0, \$119 per node. Requires: 640K RAM (DOS), 4MB RAM (Windows), 4MB hard disk space, DOS 3.1, 3.3 or later, Microsoft Windows 3.1. Artisoft Inc., 2202 North Forbes Blvd., Tucson, AZ 85745; 800-233-5564, 602-670-7100; fax, 602-670-7101.

Circle 427 on reader service card



TALKNET: You can send e-mail and attachments to other people on a LANtastic LAN.

■ Notebook PCs

Dell's Latitude: A First Step Back to Portability

BY ANGELA HICKMAN

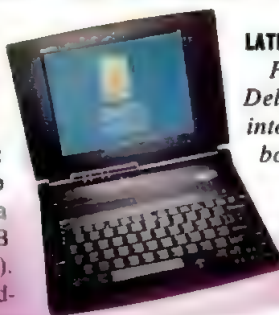
After being burned badly the first time around, Dell Computer Corp. has reentered the ultra-competitive notebook market. Its first step: the Dell Latitude, an AST-built model designed to eliminate the headaches associated with configuring notebooks with peripheral components.

We looked at the \$2,698 Latitude 433C. The 7.5-pound unit (with battery and AC adapter) uses a 33-MHz 486SX processor and came to PC Magazine Labs with a 170MB hard disk and 8MB RAM (expandable to 20MB). Though a modem isn't included as standard equipment, the Latitude comes with Traveling Software's CommWorks for Windows and a one-month trial subscription to both both America Online and RadioMail.

The 1.7- by 11.7- by 8.6-inch (HWD) Latitude has a spacious 9.5-inch dual-scan passive-matrix color screen that comfortably supports 256 colors at 640-by-480 resolution. Dual-scan

color is an inexpensive way to bring color to notebooks, but if you're looking for a mobile presentation system, don't expect the Latitude's screen to allow for the kind of wide-angle viewing you'll find on active-matrix color notebooks.

The Latitude turned in average performance numbers on



LATITUDE: This PC heralds Dell's reentry into the notebook arena.

our benchmark tests. It had poor DOS video and Disk WinMark test scores, but it produced decent Graphics WinMark and Winstone results—good news for frequent Windows users. It had a battery rundown time of almost 4 hours, an impressive result when you take into consideration its 5-volt 486SX/33 chip and energy-draining color screen.

Dell outfits all Latitude models with one PCMCIA slot for either a Type II or Type III card, and the system is preconfigured to accept most PCMCIA-based modems and network adapter cards and to swap them in and out without rebooting. Installation of PCMCIA cards and other peripheral devices is almost trouble-free because of the Latitude's automatic setup feature. The addition of new components prompts a setup screen that automatically configures the device to the notebook.

Almost all notebooks now have some kind of built-in pointing device. Unfortunately, the Latitude's is awkwardly situated in the bottom-right corner of the keyboard, making it difficult to manipulate with any degree of speed or accuracy.

Things will get more interesting for Dell when it introduces a subnotebook model later in the year. In the meantime, the Latitude proved to be a safe, if not stellar, reentry into the notebook market for Dell.

•List price: Dell Latitude 433C with 8MB RAM, 170MB hard disk, \$2,698; Dell Computer Corp., 9505 Arboretum Blvd. Austin, TX 78759; 800-289-3355, 512-338-4400; fax, 512-728-3653.

Circle 423 on reader service card

■ Monitors

NEC's 27-Inch MultiSync 4PG: Making Multimedia Look Great

BY BRUCE BROWN

Looking for a multipurpose presentation monitor for your boardroom or conference room? How about a sturdy monitor to show training tapes or to demonstrate software programs? NEC Technologies' new 27-inch NEC MultiSync 4PG Multimedia Monitor will handle all of your video and RGB presentation needs. Its \$3,695 estimated selling price (with actual street prices closer to \$3,300) keeps the 4PG out of the reach of typical PC users, but it is no typical monitor.

MULTIPLE INPUTS

With two RGB inputs and two inputs for video signals, the 4PG can be hooked simultaneously to a television input, a VCR or video camera, and two computers (PC and Macintosh video signals are both supported). Both video inputs and one of the RGB inputs include stereo audio inputs for quality sound that can be played through internal stereo speakers or output to an external amplifier or speakers. Every video and audio input has a corresponding set of output plugs so you can rig up to 50 monitors in a series for spectacular large-room presentations.

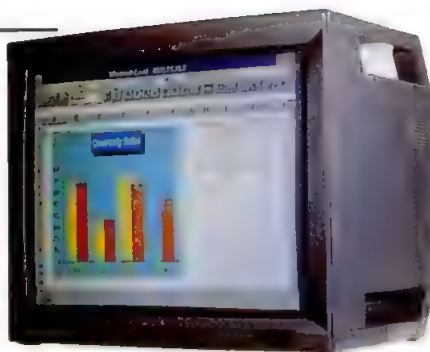
The 4PG comes with a wireless remote control (which can also operate with an included 12-foot wire) to select the display device; adjust image size, position, pincushioning, contrast, brightness, color, and tint; and control sharpness. The remote control also has a monitor degauss button and volume and mute controls.

With its flat-square shadow mask tube, the 110-pound 4PG is a multisynchronous monitor

with a horizontal scanning range of 15.5 to 50 kHz and vertical range of 40 to 120 Hz. Maximum rated resolution is 1,024-by-768 at 60 Hz. Video support includes VGA, XGA2, NTSC, M-NTSC, PAL (European), and S-Video signals.

FOR MANY SITUATIONS

Because it won't handle the highest resolutions, you won't use this monitor in engineering



BIG PICTURE:

The 4PG is a good all-around presentation monitor.

workstations, and because it doesn't have surround sound, you won't find it suitable for workplace theater applications. But neither of those uses really fits its target market. The 4PG is particularly suited for applica-

tions that call for an all-purpose presentation monitor. Whether your presentations are straight from software such as Lotus Freelance Graphics or Microsoft Powerpoint (saving the expense and time of printing hard copies in color), live computer demonstrations, broadcast television, cam-

era, or videotape the 4PG displays a big, bright image and lets you easily switch between input sources. It's a real eye-catcher.

• Estimated price: NEC MultiSync 4PG Multimedia Monitor, \$3,695; NEC Technologies Inc., 1255 Michael Dr., Wood Dale, IL 60191; 800-388-8888, 708-860-9500; fax 800-366-0476.

Circle 419 on reader service card

■ Video

Number Nine Delivers Great Graphics Speed Under \$350

BY BEN MYERS

Number Nine Computer Corp.'s #9GXE64 graphics cards use S3's Vision864 chip, making them some of the first cards to have a 64-bit graphics memory bus. By using inexpensive DRAM memory, Number Nine has kept pricing fairly modest: \$249 with 1MB of memory and \$349 with 2MB. Two years ago, a card with comparable performance and features cost nearly ten times as much.

The #9GXE64 is available for systems with either PCI or VL-Bus expansion slots. We tested installation of the PCI version in a Dell Dimension XPS P60 system with a 60-MHz Pentium processor. The jumperless #9GXE64 easily plugged into an available PCI bus slot, and Number Nine's custom-designed Windows program made short work of device driver installation and setup. Number Nine also provides drivers for programs in the AutoCAD/ AutoShade family of products.

INCLUDED UTILITIES

The #9GXE64 card has Windows utilities to adjust monitor timings and the position of the display, to change resolutions, to set up a virtual screen, and to use a built-in screen dimmer/blanker. The virtual screen feature lets you choose a screen width or height twice the actual monitor size and to pan around within the larger virtual screen area. The screen-dimming function works only with monitors that comply with the VESA's DPMS power-management specification, but the screen blanker works with any VGA or better monitor.

64-BIT DATA PATH

S3's Vision864 chip takes its name from its 64-bit interface to the display memory on the graphics card. This wide data path allows the chip to refresh more data on the screen at once, and permits flicker-free operation at high resolutions and color depths.

During testing on a 60-MHz Pentium-based Gateway 2000

system with a PCI bus, the #9GXE64 was able to yield a Graphics WinMark score of 21.5 million pixels per second, while its Winstone 94 result was a strong 58.3. The card also did well on our PC Bench 8.0 video tests, as do many cards based on S3 chip technology. All the results are consistent with its ability to display animations smoothly, regenerate drawings quickly, and accelerate spreadsheet operations.

The intense competition among graphics chip makers and the widespread availability of high-speed PCI and VL-Buses will continue to push performance up and drive prices down. Number Nine's #9GXE64 is among the first of the latest generation of fast, inexpensive, and feature-laden graphics cards, and it certainly won't be the last.

• List price: #9GXE64 with 1MB DRAM, \$249; with 2MB DRAM, \$349. Number Nine Computer Corp., 18 Hartwell Ave., Lexington, MA 02173; 800-438-6463, 617-674-0009.

Circle 420 on reader service card

Remote Control

New Windows Version Makes CoSession Easier to Use

BY M. DAVID STONE

CoSession, from Triton Technologies, has long been a presence among remote-control programs, helping users control a PC from a distance over phone lines. But despite offering faster than average screen updates and file transfers, it has been hobbled in the past by a clumsy command structure. The good news is that CoSession for Windows addresses ease of use in ways that earlier DOS-based versions never did. One set of host and remote modules costs \$199, and you can load either or both modules on two PCs.

The CoSession host module is unusual in that it's actually a DOS TSR, with the Windows

software serving only as a front end. That's good if you only use Windows occasionally, but remember that TSRs eat up memory. According to Triton, if there's room the TSR will load itself completely into upper memory, but on our test system it also used about 33K of conventional memory.

In addition, the program comes with a TSR for redirecting drives. If you take advantage of this TSR, you can, for example, use a Copy command in File Manager to transfer files between systems. The module will also load part of itself into upper memory. On our test system, however, it took up 23K of conventional memory, too.

In our testing, the redirection

TSR often caused errors when used with DOS windows, but it worked well enough with DOS itself or with Windows programs.

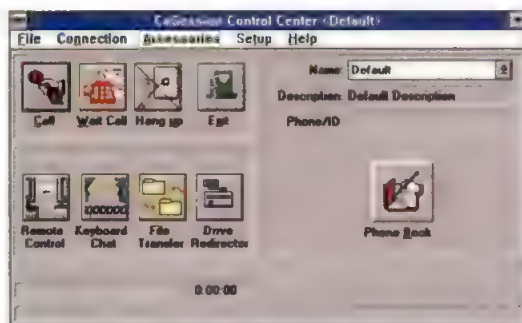
Once you're in Windows, you'll find that the CoSession host and remote modules both provide main screens with clearly labeled icons for giving key commands, such as Call and Hang Up.

One nice touch in CoSession is its ability to run higher resolutions on the host than on the remote side. CoSession simply adds scroll bars so you can scroll through the higher-resolution

image—up to 1,280-by-1,024—on the lower resolution screen. The program can also translate between 256 colors on one system and the 16-color Windows default on the other.

• **List Price:** *CoSession for Windows* \$199. Requires: 2MB RAM, 2.5MB hard disk space, Microsoft Windows 3.1. Triton Technologies Inc., 200 Middlesex Turnpike, Iselin, NJ 08830; 800-322-9440, 908-855-9440; fax, 908-855-9608.

Circle 422 on reader service card



LONG DISTANCE: Icons keep CoSession friendly.

On-Line Communications

Golden CommPass: The OS/2 Way to Tackle CompuServe

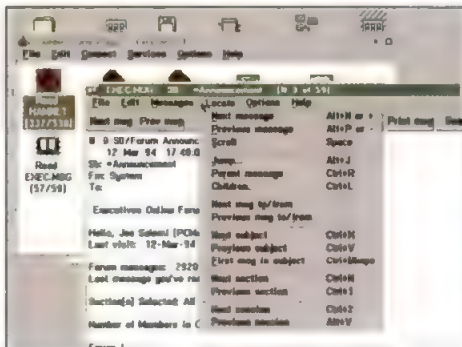
BY JOE SALEMI

Creative Systems Programming Corp.'s Golden CommPass is the only OS/2-based off-line navigation program for CompuServe. The \$99 Version 2.1 brings the package up to full 32-bit power while maintaining compatibility with the popular TAPCIS navigation program. Golden CommPass is an ideal tool

for OS/2 2.x users looking for a less expensive and simpler way to interface with CompuServe.

Since the beginning, Golden CommPass has been completely compatible with TAPCIS; it uses the same file formats. It's also compatible with TAPCIS add-ons that help you manage messages.

But that's where the similarities end. Golden CommPass gives you a number of features



MULTITHREADING keeps things moving.

that aren't possible under DOS, and the most obvious is access to OS/2's Presentation Manager. This is a graphical app, and it provides dialog boxes, pick lists, and drag-and-drop capabilities. Icons represent read and unread forum messages, messages waiting to be uploaded, and requests for a catalog from a library.

Golden CommPass also takes full advantage of OS/2's multitasking and multithreading

capabilities. Because it is a native OS/2 application, it can download messages in the background without significantly affecting sys-

tem performance. The communications engine and message reader run in separate threads, so you can even begin to read messages downloaded from one forum while

Golden CommPass continues to download from others.

Golden CommPass is a full 32-bit application, which really helps when you load and index large message and catalog files. On our 66-MHz 486 test system (with 8MB of RAM), we were able to start reading new messages

within a second of clicking on the forum's icon.

As you might expect, Golden CommPass is supported on CompuServe, in the CIS:GCP-SUPPORT forum.

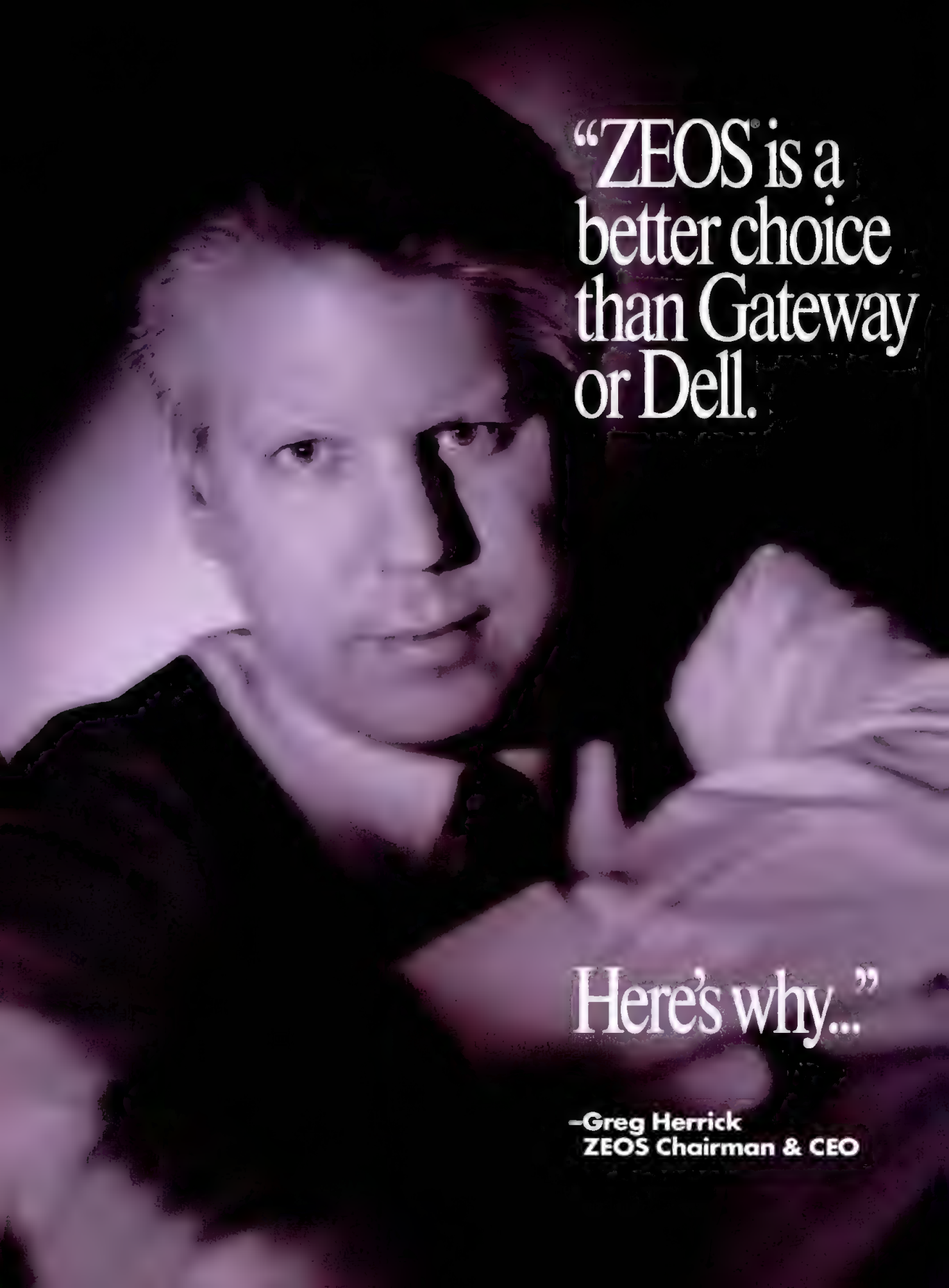
Current users can use the forum to get help with the program, as well as the latest patches and updates. CompuServe (and ZiffNet) are important resources for OS/2 users, and Golden CommPass provides the best way to make effective use of those resources.

• **List Price:** *Golden CommPass 2.1*, \$99. Requires: 6MB RAM, 2MB hard disk space, OS/2 2.0 or later. Creative Systems Programming Corp., P.O. Box 961, Mount Laurel, NJ 08054; 609-234-1500.

Circle 421 on reader service

FIRST LOOKS PLUS

From May 2 through May 6, you can go on-line to download a working demo (for OS/2) of Golden CommPass or to discuss the program with Joe Salemi and Golden CommPass author Larry Finkelstein. Type GO EXEC from any CompuServe prompt.



“ZEOS[®] is a
better choice
than Gateway
or Dell.

Here's why...”

—Greg Herrick
ZEOS Chairman & CEO



At ZEOS, Gateway and Dell are our best source of new customers. Why?

Because many who buy from ZEOS also consider these worthy competitors. They make the comparisons: price, performance, quality, and service and support. They compare it all.

What they come away with, and what I believe you too will come away with, is the firm conclusion that ZEOS really does offer you a better deal.

Feature for feature, ZEOS beats them both hands down. Factor in our new lower prices and ZEOS walks away with it.

You would expect nothing more from the company that invented live 24-hour technical support. Or the company that ships approximately half its orders within 24 hours of receipt. Or the company that has won more *PC Magazine* Readers' Choice for Service & Reliability awards than any other.

If you're tired of busy signals. Tired of confusing product lines. Tired of waiting for deliveries. And tired of getting just a little bit less than what you really want—tire no longer.

Call ZEOS and you'll see why our best source of new customers is our competitors.

Greg Herrick
ZEOS, Chairman & CEO

P.S. Find out right now by calling a ZEOS Systems Consultant at 800-554-7172. We're open for you 24 hours a day!



ZEOS® 486 PC's Now To 100MHz!

STANDARD WITH EVERY ZEOS UPGRADABLE SYSTEM



■ Intel Verified: for the Pentium™ OverDrive™ Processor. Zero Insertion Force (ZIF) socket makes upgrading easy.

- RAM expandable to 64MB on the motherboard.
- Two serial ports and one parallel port integrated on the motherboard.
- Flash BIOS for easy upgradability.
- Eight expansion slots: two VESA local bus, five 16-bit and one 8-bit.
- ZEOS six-bay desktop case with two cooling fans.
- 200 watt power supply with built-in surge suppression; switchable between 115/230V.
- Socket for inexpensive optional on-board SCSI.
- Shadow RAM support.
- ZEOS 101-key space-saving keyboard.
- EPA Energy Star compliant.
- FCC Certified Class B; UL Listed.
- Complete ZEOS Customer Satisfaction Package.

PACKAGE 1	PACKAGE 2	PACKAGE 3	PACKAGE 4
486SX-25 \$1195 Lease \$50/month 486DX-33 \$1395 Lease \$59/month 486DX2-50 \$1495 Lease \$63/month 486DX2-66 \$1595 Lease \$58/month 486DX4-75 \$1795 Lease \$65/month 486DX4-100 \$1995 Lease \$72/month	486SX-25 \$1395 Lease \$59/month 486DX-33 \$1595 Lease \$58/month 486DX2-50 \$1695 Lease \$61/month 486DX2-66 \$1795 Lease \$65/month 486DX4-75 \$1995 Lease \$72/month 486DX4-100 \$2195 Lease \$79/month	486SX-25 \$1795 Lease \$65/month 486DX-33 \$1995 Lease \$72/month 486DX2-50 \$2095 Lease \$76/month 486DX2-66 \$2195 Lease \$79/month 486DX4-75 \$2395 Lease \$87/month 486DX4-100 \$2595 Lease \$94/month	486SX-25 \$2195 Lease \$79/month 486DX-33 \$2395 Lease \$87/month 486DX2-50 \$2495 Lease \$90/month 486DX2-66 \$2595 Lease \$94/month 486DX4-75 \$2795 Lease \$101/month 486DX4-100 \$2995 Lease \$108/month
■ Intel Verified: for the Pentium™ OverDrive™ Processor ■ 2MB high-speed RAM ■ 107MB local bus IDE hard drive with 32K cache ■ 3.5" 1.44MB floppy disk drive ■ Diamond SpeedStar Pro Windows-accelerated local bus video with 1MB RAM. (16.7 million colors) ■ ZEOS 14" 1024 x 768 NI SVGA color monitor, .28mm dot pitch ■ Microsoft DOS 6.2 with Enhanced Tools	■ Intel Verified: for the Pentium™ OverDrive™ Processor ■ 4MB high-speed RAM ■ 214MB local bus IDE hard drive with 32K cache ■ 3.5" 1.44MB floppy disk drive ■ Diamond SpeedStar Pro Windows-accelerated local bus video with 1MB RAM. (16.7 million colors) ■ ZEOS 14" 1024 x 768 NI SVGA color monitor, .28mm dot pitch ■ Microsoft DOS 6.2 with Tools, Windows for Workgroups 3.11 & Microsoft Mouse	■ Intel Verified: for the Pentium™ OverDrive™ Processor ■ 8MB high-speed RAM ■ 426MB, 13ms local bus IDE hard drive with 128K cache ■ 2X CD-ROM drive, 3.5" 1.44MB floppy drive ■ Diamond SpeedStar Pro Windows-accelerated local bus video with 1MB RAM. (16.7 million colors) ■ ZEOS 14" 1024 x 768 NI SVGA color monitor, .28mm dot pitch ■ Microsoft DOS 6.2 with Tools, Windows for Workgroups 3.11 & Microsoft Mouse ■ Choice of Lotus Windows application	■ Intel Verified: for the Pentium™ OverDrive™ Processor ■ 16MB high-speed RAM ■ 528MB, 12ms local bus IDE hard drive with 256K cache ■ 2X CD-ROM drive, 3.5" 1.44MB floppy drive ■ Diamond SpeedStar Pro Windows-accelerated local bus video with 1MB RAM. (16.7 million colors) ■ ZEOS 14" 1024 x 768 NI SVGA color monitor, .28mm dot pitch ■ Microsoft DOS 6.2 with Tools, Windows for Workgroups 3.11 & Microsoft Mouse ■ Choice of Lotus Windows application

FAVORITE OPTIONS

426MB to 528MB HDD UPGRADE	\$95
ADAPTEC 6360 SCSI CONTROLLER CHIP For on-board SCSI. Includes drivers	\$49
96/48/24 V.42 bis SEND/RECEIVE FAX MODEM	\$49
DIAMOND VIPER VIDEO CARD With 1MB VRAM: \$149 With 2MB VRAM: \$249	
15-INCH MONITOR UPGRADE SVGA non-interlaced, 1024 x 768, flat screen.....	\$95

10-BAY VERTICAL CASE	\$95
LOTUS SMARTSUITE UPGRADE Five Windows applications in one box!	\$299
COMPLETE MULTIMEDIA PACKAGE Double-speed, multisession, MPC2 compliant CD-ROM. 16-bit/48KHz sound card (Sound Blaster and Adlib compatible). Stereo speakers	\$299

Many other affordable upgrades and options available.
Call for details!

FREE SOFTWARE

Most packages include Microsoft DOS and Windows for Workgroups. Upgradable packages 3 and 4, and Pantera packages 2, 3 and 4 come with your choice of either Lotus Ami Pro, Freelance, 1-2-3, Improv, Organizer or Approach.



EPA ENERGY STAR COMPLIANT

Others will be green with envy! Get all the great performance of a ZEOS 486 Upgradable and conserve energy... and less energy means real savings for you, your business, and the environment!

CALL NOW TOLL FREE
800-554-7172



We build every ZEOS system to offer better, more trouble-free operation than either Dell or Gateway.

Perhaps that's why ZEOS has earned five *PC Magazine* Readers' Choice for Service & Reliability awards. More than any other manufacturer.

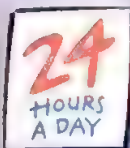


ZEOS systems offer more features and better performance than seemingly comparable offerings from any principal competitors.

ZEOS systems are 100% compatible with all major operating systems. We even maintain our own in-house Novell certified testing lab assuring you trouble-free network operations.



ZEOS is your 24-hour company. We ship approximately half our systems the same day they're ordered—you can often receive your systems within 24 hours. What's more, in the unlikely event you have a problem, a factory technician is available toll-free 24 hours a day—every day!



ZEOS® Pantera™ Now To 90MHz!

STANDARD WITH EVERY ZEOS PANTERA™ SYSTEM	PACKAGE 1	PACKAGE 2	PACKAGE 3	PACKAGE 4
- Intel Pentium™ Processor running at 60MHz, 66MHz or 90MHz. 256KB cache expandable to 512KB. - RAM expandable to 192MB on the motherboard. - Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM. - Two high-speed serial ports and one enhanced parallel port on the motherboard. - Three PCI slots and five ISA slots. 12-bit ADPCM business audio integrated on the motherboard. - Socket for optional on-board Fast SCSI-2 support. - Flash BIOS for easy upgradability. 200 watt power supply with built-in surge suppressor. Switchable between 115/230V. - ZEOS 101-key space-saving keyboard. - FCC Certified Class B; UL Listed. - ZEOS Customer Satisfaction Package. 	PANTERA 60 \$2195 Lease \$79/month PANTERA 66 \$2395 Lease \$87/month PANTERA 90 \$2595 Lease \$94/month - Intel Pentium Processor 4MB RAM 214MB local bus IDE hard drive with 32K cache 3.5" 1.44MB floppy drive - Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM. (16.7 million colors) - ZEOS 14" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch - Six-bay desktop case with two cooling fans - MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse	PANTERA 60 \$2595 Lease \$94/month PANTERA 66 \$2795 Lease \$101/month PANTERA 90 \$2995 Lease \$108/month - Intel Pentium Processor 8MB RAM 340MB local bus IDE hard drive with 128K cache 2X CD-ROM drive, 3.5" 1.44MB floppy - Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM. (16.7 million colors) - ZEOS 14" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch - Six-bay desktop case with two cooling fans - MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse - Choice of Lotus Windows application	PANTERA 60 \$3095 Lease \$102/month PANTERA 66 \$3295 Lease \$109/month PANTERA 90 \$3495 Lease \$115/month - Intel Pentium Processor 12MB RAM 528MB local bus IDE hard drive with 128K cache 2X CD-ROM drive, 3.5" 1.44MB floppy - Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM. (16.7 million colors) - ZEOS 15" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch - Six-bay desktop case with two cooling fans - MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse - Choice of Lotus Windows application	PANTERA 60 \$3695 Lease \$122/month PANTERA 66 \$3895 Lease \$129/month PANTERA 90 \$4095 Lease \$135/month - Intel Pentium Processor 16MB RAM 1GB SCSI hard drive with 256K cache - On board Adaptec SCSI controller 2X CD-ROM drive, 3.5" 1.44MB floppy - Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM. (16.7 million colors) - ZEOS 15" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch - Six-bay desktop case with two cooling fans - MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse - Choice of Lotus Windows application
FAVORITE OPTIONS				
340MB to 426MB HDD UPGRADE\$55 ADAPTEC 6360 SCSI CONTROLLER CHIP For on-board SCSI.....\$49 INTERNAL 14,400 bps V.32 bis MODEM WITH 14,400 bps SEND/RECEIVE FAX.....\$139 1MB TO 2MB VIDEO RAM UPGRADE Add additional memory for greater video performance.....\$59 DIAMOND VIPER/PCI VIDEO CARD WITH 2MB VRAM Fastest Windows accelerated video.....\$249 ARCHIVE SUPERHORNET INTERNAL TAPE BACKUP 80 to 250MB (with compression), includes backup software.....\$169		MULTIMEDIA UPGRADE If your system includes a CD-ROM drive, upgrade with a sound card and speakers.....\$148 300 WATT POWER SUPPLY UPGRADE\$50 MICROSOFT WINDOWS NT A 32-bit high-performance operating system for client-server computing.....\$329 LOTUS SMARTSUITE UPGRADE Five Lotus applications in one bundle!.....\$299 <i>Many other affordable upgrades and options available. Call for details!</i>		

NETWORK NEEDS Add a network card to your system, or if you need 32-bit data transfers on your network, ZEOS EISA systems are the right choice for you. Call for details.

CALL NOW TOLL FREE
800-554-7172



ZEOS® Can Ship Today!

ENDLESS POSSIBILITIES WITH ZEOS.

We're offering you an advantage other companies can't. High-quality, affordable computers in many money-saving configurations (or the option to custom-build one to your exact needs). Sound familiar? It's not. We also give you award-winning service and toll-free support—24 hours a day, every day.

And there's more! If you order a *Computers Now!* system (samples are shown below) before 1 p.m., Monday-Friday, we'll ship it the day you order.* If you'd like to see our complete line of ZEOS products and options, we'll send you a free catalog. Call 800-554-7172 now for your computer or your catalog.



Ambra™
486SX-25
\$1195

PACKAGE #1:

- 4MB RAM, 128K SRAM cache
- 214MB hard drive, 32K cache
- 3.5" floppy drive
- VESA local bus SVGA color video
- SVGA color monitor
- DOS, Windows for Workgroups, Mouse



486DX-33
\$1595

PACKAGE #2:

- 4MB RAM
- 214MB local bus IDE hard drive, 32K cache
- 3.5" floppy drive
- Windows-accelerated local bus video
- SVGA color monitor
- DOS, Windows for Workgroups, Mouse



486DX-33
\$1995
486DX2-66
\$2195

PACKAGE #3:

- 8MB RAM
- 426MB local bus IDE hard drive, 128K cache
- 2X CD-ROM drive, 3.5" floppy drive
- Windows-accelerated local bus video
- SVGA color monitor
- DOS, Windows for Workgroups, Mouse
- Choice of Lotus application



486DX-33
\$2143
486DX2-66
\$2343

PACKAGE #3MM:

- 8MB RAM
- 426MB local bus IDE hard drive, 128K cache
- 2X CD-ROM drive, 3.5" floppy drive
- Multimedia upgrade: 16-bit sound card, stereo speakers
- Windows-accelerated local bus video
- SVGA color monitor
- DOS, Windows for Workgroups, Mouse
- Choice of Lotus application



486DX2-66
\$2695

PACKAGE #3 TOP GUN:

- 8MB RAM
- 256K SRAM system cache
- 528MB local bus IDE hard drive, 256K cache
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond Viper local bus video card
- 15" SVGA color monitor
- 14,400 bps V.32 bis send/receive fax modem
- DOS, Windows for Workgroups, Mouse
- Choice of Lotus application



Pantera 60
\$3295
Pantera 66
\$3495

TOP FLIGHT:

- Intel Pentium Processor
- 16MB RAM, 256K cache
- 528MB local bus IDE hard drive, 256K cache
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond Viper/PCI local bus graphics with 2MB RAM
- 15" SVGA color monitor
- 10-bay vertical case
- DOS, Windows for Workgroups, Mouse
- Choice of Lotus application



Contenda™
386SL-25
\$1344

PACKAGE #2 PLUS:

- 4MB RAM
- 80MB IDE hard drive
- External 3.5" floppy disk drive
- Internal fax modem
- DOS, Windows for Workgroups
- Lotus Organizer
- 9.7" x 6.1"; 3.9 lbs.



Freestyle™
486SL-25
\$2195

PACKAGE #3:

- 8MB RAM
- 260MB IDE hard drive
- Internal 96/24 send/receive fax modem
- Custom nylon carrying case
- Extra battery
- External charging stand
- DOS, Windows for Workgroups
- 8.5" to 11.3" x 1.75" to 2.25"; 5.6 lbs.

OUR GUARANTEE TO YOU:

If we accept your order for immediate shipment and fail to ship your system under the conditions outlined, we will ship it *at our expense* as soon as it is ready.*

**CALL NOW TOLL FREE
800-554-7172**



Fax Orders: 800-362-1205 or 612-362-1205. Phone orders: Government: 800-245-2449. Outside U.S. and Canada: 612-362-1212. Purchase Orders, MasterCard, VISA, Am Ex, Discover, Z-Card™, COD and affordable leasing programs. Open 24 Hours a Day, 365 Days a Year!

*Orders must be for Computers Now! configurations; we've listed just a sampling here. Since we continuously update this list of configurations, please call to confirm your system is on the list. This offer is good only as long as these pre-built systems remain in stock. Other ZEOS systems and custom configurations may take slightly longer—about a week. All orders are subject to credit approval. Orders must be received by 1 p.m. Central Time, M-F. Purchase orders are subject to approval. Business leasing programs available. All prices, specifications and availability are subject to change without notice; call to confirm these and warranty details. Prices do not include shipping. Novell compatibility is Developer Tested Only. Novell makes no warranties with respect to this product. All products and company names are trademarks or registered trademarks of their respective holders. Intel, Pentium and OverDrive are trademarks of Intel Corporation. ZEOS and Contenda are registered trademarks; Z-Card and Computers Now! are registered servicemarks; Ambra and Freestyle are trademarks of ZEOS International Ltd. © 1994 ZEOS International Ltd., 1301 Industrial Blvd., Minneapolis, MN 55413 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS). UPPEN-PCM-9405A-1

CIRCLE 155 ON READER SERVICE CARD



TAKE YOUR PICK OF ZEOS SYSTEMS WITH THE BEST MULTIMEDIA

AMBRA™

486SX-25 \$1494
486DX-33 \$1694

- 4MB RAM, 128K SRAM cache
- 214MB IDE hard drive, 32K cache
- 3.5" floppy drive
- Multimedia upgrade
- Local bus video
- 14" SVGA color monitor, .28mm dot pitch
- DOS, Windows for Workgroups, Mouse

UPGRADABLES

486DX2-66 \$2343
486DX4-100 \$2743

- 8MB RAM
- 426MB local bus IDE hard drive, 128K cache
- 2X CD-ROM drive, 3.5" floppy drive
- Multimedia upgrade
- Local bus video with 1MB RAM
- 14" SVGA color monitor, .28mm dot pitch
- DOS, Windows for Workgroups, Mouse
- Choice of Lotus application

PANTERA™

PENTIUM™-60 \$3243
PENTIUM™-66 \$3443

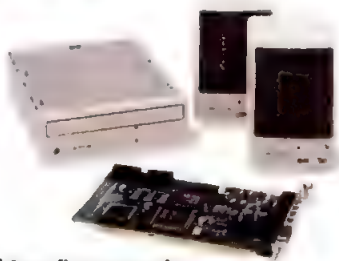
- 12MB RAM, 256K SRAM cache
- 528MB local bus IDE hard drive, 256K cache
- 2X CD-ROM drive, 3.5" floppy drive
- Multimedia upgrade
- Local bus video with 1MB RAM
- 15" SVGA color monitor, .28mm dot pitch
- DOS, Windows for Workgroups, Mouse
- Choice of Lotus application

The Sights And Sounds Of Multimedia.

OPEN YOUR EYES AND EARS TO A WHOLE NEW ZEOS® COMPUTER

Activate your senses. Animation. Colors. Audio. It's all waiting to be unleashed. Multimedia is here—so unlock your business potential.

Stop with the BLAH presentations. Creativity is the key. Capture the attention of a *bored* room with the dynamic avenues multimedia offers. Add our Multimedia Package to any ZEOS desktop or vertical system and join the forces of sight and sound. Hi-Fi stereo music, business audio, full-motion video and intense graphics can be an integral part of your everyday computing.



Multimedia Upgrades

*Purchase one of the above multimedia systems.
Or add a Multimedia Upgrade to any other
ZEOS desktop or vertical system for only..... \$299
If your system includes CD-ROM,
add a sound card and speakers for only..... \$148*

We include the latest multimedia products in our Multimedia Package for maximum impact and performance. A double speed multisession MPC2 compliant CD-ROM. A 16-bit sound card (Sound Blaster and Adlib compatible) that delivers the ultimate in performance and compatibility. And, a pair of amplified stereo speakers with volume control and bass booster.

Together, the Multimedia Package translates into a creative business solution...and more. In addition to presentations, multimedia means desktop imaging, education, games, video and music. It's serious business and pure entertainment. It's available now. It makes sense.

Fax Orders: 800-362-1205 or 612-362-1205. Phone orders: Government: 800-245-2449, Outside U.S. and Canada: 612-362-1212. Purchase Orders, MasterCard, VISA, Discover, Am Ex, Z-Card, COD and affordable leasing programs. Open 24 Hours a Day, 365 Days a Year!

Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 36-month lease; 10% purchase option. All prices, specifications and availability are subject to change without notice; call to confirm these and warranty details. Prices do not include shipping. All products and company names are trademarks or registered trademarks of their respective holders. ZEOS is a registered trademark; Z-Card and Computers Now! are registered service marks of ZEOS International Ltd. © 1994 ZEOS International Ltd., 1501 Industrial Blvd., Minneapolis, MN 55413 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS). MM-PCM-9405A

CALL NOW TOLL FREE
800-554-7172
24 HOURS A DAY



■ Spreadsheet Utilities

The Baarns Utilities, Braincel: Two Ways to Turbocharge Excel

BY CRAIG STINSON

Despite all the bells and whistles Microsoft has squeezed into Excel 5.0, there is still plenty of room for creative add-on products. Two of the newest are The Baarns Utilities 5.0, a collection of tools to assist with everyday worksheet tasks, and Braincel, Version 2.0, a program that uses Excel as the front end of a neural-network decision-making engine.

THE BAARNS UTILITIES

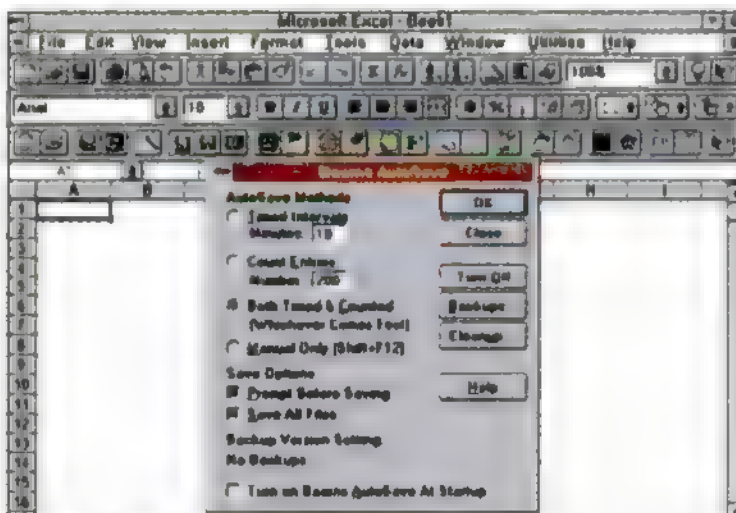
Four of the 22 tools in the \$89.95 Baarns collection take Excel beyond its normal analytic purposes, making the spreadsheet slightly more suitable as an all-day work environment. A Timer tool, for example, keeps a running stopwatch in the background, letting you track the number of minutes or hours you spend on particular projects. A Reminders tool lets

you set any number of alarms, which can go off either at absolute times or at intervals. A Phone Dialer gives you an alphabetized phone book and lets you send numbers to the modem with a point-and-click. And a Clock tool reports the time in a stay-on-top window.

Two of the tools, Text-O-Matic and CaseMaster, can help you manage global changes to cells with labels and are useful particularly for cleaning up imported text files. CaseMaster applies case changes (all caps, all lowercase, initial cap each word, or initial cap each sentence) to a selection. Text-O-Matic adds or

deletes specified characters at the beginning or end of each cell in a selection. One option lets you remove unprintable characters—lets you empty the non-ASCII trash without having to specify unwanted characters.

A substantial portion of the Utilities set is aimed at improving your management of native Excel files. With File Express and Path Manager, for example, you can designate long descriptive names for the files and directory paths you use most often and then select those names from dialog boxes when it comes time to open or close files. With Save As Icon, you



THE BAARNS UTILITIES: 22 ways to make your spreadsheet work easier.

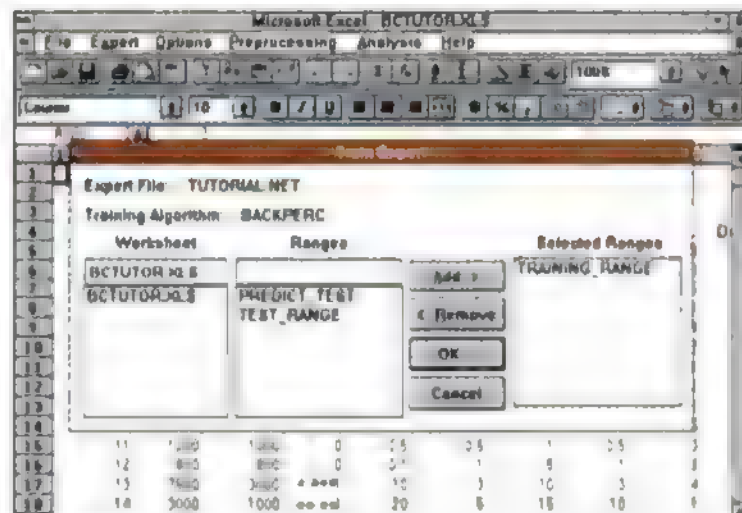
can create a Program Manager launch icon for the current document without leaving Excel.

Other welcome components include a versatile AutoSave tool and a Template Wizard. The wizard creates reusable templates from existing documents or helps you build new ones from scratch and, like the File Express and Path Manager tools, lets you assign long descriptive names. A handy option overrides Excel's default sheet and book templates, making it simple, for example, to create new workbook pages with non-standard defaults.

The Utilities' one drawback

is their heavy use of memory and other resources. Autoloading the set on a 33-MHz 486 with 4MB of memory more than doubled Excel's start-up time, reduced the pool of RAM and virtual memory by nearly a megabyte, and took system resources down from 66 percent to 47 percent. If the extra start-up time is unacceptable, you can invoke the Utilities only when you need them and banish them when you've finished.

The Baarns Utilities are full of good ideas, but they'd be even more useful if they were broken up into smaller sets that could be loaded individually.



BRAINCEL brings neural-networking technology to your analyses.

BRAINCEL

For decision-making that can't be handled easily by traditional spreadsheet formulas, a neural network may be just the ticket. Neural nets are ideal for discovering nonobvious relationships between inputs and outputs in historical data. Applications cover the gamut from market forecasting to predicting the size of this season's salmon run.

Traditionally this technology has been expensive and arcane. Promised Land's \$249 Braincel makes it inexpensive, usable, and technically unforbidding (if not entirely unmysterious).

Anyone with basic spreadsheet skills and a willingness to read a manual carefully should be able to make good use of the Braincel program.

With Braincel, you set up inputs and outputs in separate worksheet columns, designate a portion of your historical data as a training range, and then invoke a custom menu to begin training an Expert. After the Expert has been trained, you confirm its expertise by letting it generate outputs from a portion of the historical inputs that it hasn't yet seen. If the Expert's outputs match the historical outputs to an acceptable degree, you're ready to use it on new data.

Version 2.0 is a modest revision of a program that's been available for about three years. The most important change is that the DDE linkage of Version 1.0 has been replaced by a DLL. The program now trains and predicts much more

quickly, and, while you can no longer run it in the background, you can interrupt and resume at will.

Other improvements include a search feature that finds an optimum network structure automatically and some charting options to assist the advanced user in

hand-tuning the network structure.

• List price: *The Baarns Utilities 5.0*, \$89.95. Requires: *Microsoft Excel 4.0 or later*. Baarns Consulting Group, 12807 Borden Ave., Sylmar, CA 91342; 800-377-9235, 818-364-6148 fax 818-367-9673.

Circle 417 on reader service card

• List price: *Braincel, Version 2.0*, \$249 (introductory offer, \$99). Requires: *Microsoft Excel 4.0 or later*. Promised Land Technologies Inc., 195 Church St., #300, New Haven, CT 06510; 800 243-1806, 203-582-7335; fax, 203-624-0655.

Circle 418 on reader service card

THE EASIEST TO USE WINDOWS SPREADSHEET



Discover what 1 million new users already know

The world's best spreadsheet is also the world's best deal

Quattro® Pro 5.0 for Windows is the #1-selling spreadsheet in the world. That's because now you can get the spreadsheet the experts are calling "THE BEST" at a price that's too good to believe.

"Highest user satisfaction ratings of the top 3 Windows spreadsheets"
—Computerworld, Jan. 1994

Breakthrough technology you have to see to believe

That's why Quattro Pro is winning all the major industry awards for best spreadsheet. *InfoWorld* says, "Several innovations give Quattro Pro a leg up on the current version of Excel." Interactive Tutors teach new users how to perform common tasks. Built-in

"Experts" walk you through all your analysis, graphing, scenario management, and consolidating tasks. A complete presentation tools package allows you to create the most colorful slide shows and business presentations. The Database Desktop unlocks the

"The latest version of Quattro Pro is a winner"
—Best Buy, PC World, Feb. 1994

"Outscores 1-2-3 in performance, ease of learning and use, and quality of output"
—PC Week, Nov. 1993

doors to external databases, and the Data Modeling Desktop outperforms Lotus Improv. Plus, the new Workgroup Edition builds in full support for SQL servers, and lets you share worksheets with others over networks or E-mail.

Get the world's best-selling spreadsheet today!

Join the millions of people discovering Quattro Pro and treat yourself to the best spreadsheet your money can

buy. With our 100% money-back guarantee, you've got nothing to lose and everything to gain.



Special introductory offer extended to May 15, 1994

For details on how to win a 486 PC, see below.

90-day, money-back guarantee!
**See your dealer or call now,
1-800-336-6464, ext. 8560**
In Canada, call 1-800-461-3327.

Borland
Power made easy™

*Exclusively in the United States, visit your nearest "Borland Means Business" retailer to complete an entry form to win a 486 PC. Copyright © 1994 Borland International, Inc. All rights reserved. All Borland product names are trademarks of Borland International, Inc. Prices good in the United States and Canada only. All prices are in U.S. dollars. Dealer prices may vary. B1 6954

CIRCLE 220 ON READER SERVICE CARD

Image Capture and Editing

ImagePals 2 Embraces New Multimedia Formats

BY BARRY SIMON

Ulead Systems' ImagePals was the first in a new utility category: the graphics toolbox. By including a screen capture and conversion utility, image cataloging and viewing utilities, and image editing features all in the same box, it became a one-stop solution for most graphics management. In the new Version 2 (\$129), ImagePals cements its position as the leading graphics utility collection by sharpening up all its tools and taking a leap into multimedia management.

Each of ImagePals' modules—Album, Image Editor, and Capture—is better than before, and Ulead has added two new ones: a PhotoCD Browser (the program comes with a CD containing 2,000 images) and a general viewer. You'll find support for viewing animation, video, and sound files; better keyword controls for searching through your image catalogs; and numerous new tools for editing images.

PHOTO ALBUM

Home base in ImagePals is the module called Album, where you gather all your images together and categorize them into groups called albums. The program supports a wide variety of graphics formats, including .BMP, .CGM, .DXF, .JPEG, .PCX, Targa, .TIFF, .WMF, and .WPG. EPS files display only if they have TIFF headers.

In the albums, files appear as printable thumbnail-style slides. To help you keep track of your images, you can assign each slide a subject, a description, and several keywords. In addition, the program gives you tags labeled A through Z to which you can associate longer names; if you

know that somewhere you have a TIFF file of yellow flowers growing in front of a red house, you should have little trouble finding it. There's no shortage of ways to sort and keep track of your images. In this area, ImagePals far outstrips other image management competitors such as Inset Systems' HiJaak PRO.

You can drag-and-drop any file from an album and treat it as if it had been dragged from File Manager. If you hold the Shift key down while you drag and drop, the file is embedded with ImagePals' Viewer as the server, but the target needs to be OLE-aware. Holding the Ctrl key down while you drag and drop links the file with ImagePals' viewer rather than embedding it.

MULTIMEDIA MATTERS

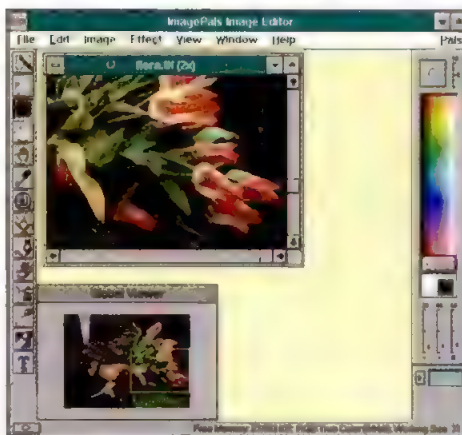
Ulead recognizes that the type of user most likely to need ImagePals is likely to be dabbling in multimedia and looking for an easy way to view and manage a wide assortment of multimedia files. ImagePals' new multimedia viewer can store and play .AVI, .MID, and .WAV files (via the the Media Player), and it can directly play .FLC and .FLI files.

These capabilities, together with a PhotoCD Browser that quickly sets up photo albums, make Album a big help for anyone who needs to wade through lots of files in order to produce a multimedia presentation. A slide-show utility that has 18 transition effects allows you to practice your presentation, even if you are planning to do

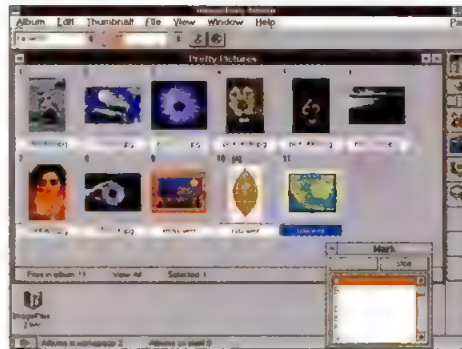
your final work in a standalone multimedia authoring program.

IMAGE EDITING

ImagePals' Image Editor has some noteworthy features that are usually associated with higher-end editors. There's a cloning feature that works not only with



CLOSE UP: To change the zoomed-in view, you drag a frame over the thumbnail view.



SORT IT OUT: Album's floating tag palette lets you categorize images in an album.

There's also a "magic wand" that finds similar colors within images and a warp grid you manually adjust to distort images. ImagePals' image editor is unique in its ability to accept input from frame-grabbing video boards.

You can store masks and subimages in what the Image Editor calls an object pool. While working this way can be useful if you need to reuse the same objects over and over, the program doesn't let you save parts of a single image in object layers for later reediting, as you can with Picture Publisher.

CAPTURE AND CONVERSION

ImagePals can save files in a variety of bitmapped formats, so the program works well as a conversion utility. Most notably, it can save files to JPEG compressed format, a helpful format to have available. Conversion only works on bitmapped files; you can't convert to vector formats.

The program's screen capture utility, already notable for its ability to capture only parts of screen images (like active windows or a user-defined area) has new post-processing tools that let you save color screens as gray scales, for example.

There is very little in the realm of image management that ImagePals can't handle well. You can't find a more complete set of image capture, conversion, and cataloging tools.

•List price: ImagePals 2, \$129; upgrade from ImagePals 1.x, \$49; upgrade from competing products, \$79. Requires: 4MB RAM, 4MB hard disk space, Microsoft Windows 3.1. Ulead Systems Inc., 970 W. 190th St., #520, Torrance, CA 90502; 800-858-5323, 310-523-9393; fax, 310-523-9399.

Circle 428 on reader service card



Around the world over nine million business users share a common practice. They back up and store important data on quarter-inch data cartridges. And the brand they choose most is 3M. For good reason.

3M data cartridges are built for reliability—from the tape formulation to the cartridge itself. Whatever capacity you need—formatted or unformatted—3M cartridges are ready to save the day with proven performance. That's why more businesses protect important information on 3M brand data storage products than any other brand in the world. For more information and your free "Data Security Handbook" call 1-800-888-1889, ext. 43.

The common denominator of business around the world.



3M data cartridges require compatible drive.

3

READER SERVICE CARD

3M Reliability

On-Line Communications

CompuServe Dials Up Its Own Windows Front End

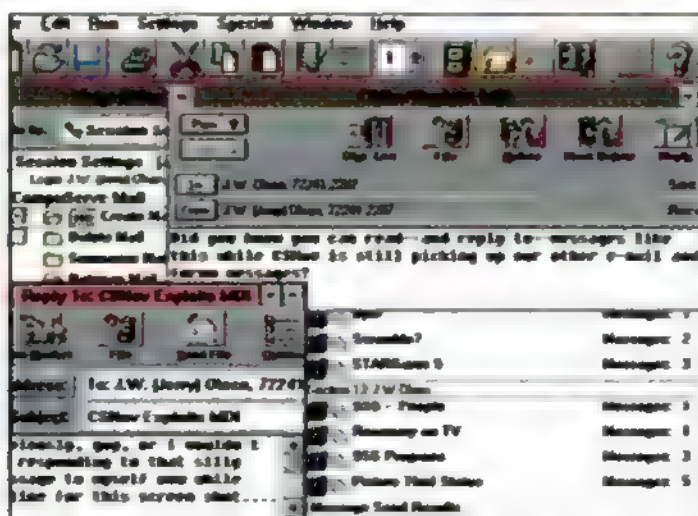
BY J. W. OLSEN

The CompuServe Information Service can overwhelm you with its sheer size, unforgiving interface, and cost. Accessing CompuServe with general-purpose communications software is hard; you face bewildering menus and prompts, and charges that mount by the minute. Even CompuServe's own CompuServe Information Manager awaits commands while the billing clock ticks. Off-line readers

like TapCIS or OzCIS are an option, but you struggle to get scripts right, and you're held hostage during on-line sessions.

CompuServe is now providing a new access solution:

CompuServe Navigator, Windows Version (CSNav), available in downloadable, software-only form for a \$30 fee that includes a \$10 usage credit. A



ON-LINE BOOST: Read and reply off-line while CSNav continues on-line.

\$50 kit including software, a manual, and a \$25 credit is also available. Or you'll be able to buy the kit in stores in June for \$79.95 (including a \$25 credit). The software includes tutorial

mode and context-sensitive help adequate for experienced users.

CSNav has a familiar Windows desktop, with essentials such as in-basket, out-basket, and address book on a toolbar. But the real action happens in a workspace that exploits Windows' Multiple Document Interface. As e-mail, forum messages, weather maps, or financial data arrive, you can optionally view or reply off-line while the on-line sessions

scroll by. Unlike off-line readers that rely upon the same ASCII interface that you see if you go on-line interactively, CSNav uses an alternate Host-Micro Interface (HMI) that speeds activity by compressing data and bypassing ASCII prompts. HMI also includes error correction.

A typical first release, CSNav has shortcomings. The most serious is that message indexes occasionally become corrupted, with



From May 2 through May 6, you can go on-line to discuss CompuServe Navigator with J.W. Olsen and Navigator product manager Tim Wheeland. Type GO EXEC from any CompuServe I prompt.

results ranging from misplaced messages to required reboot. It would be prudent to run the Index Rebuild function occasionally.

Nevertheless, CSNav is the GUI CompuServe interface leader against which challengers must now be judged. On-line novices should await the complete kit, but if you already use off-line readers, download the software (GO CSNAV on-line) and order the manual (GO ORDER

and MS&I). You will soon recoup the cost through reduced connection fees, and your CompuServe surfing will be a sheer delight.

• List price: *CompuServe Navigator, Windows Version 1.0*, \$30; with manual, \$50. Requires: 2MB RAM, 4MB hard disk space, Microsoft Windows 3.1. CompuServe Inc., P.O. Box 20212, Columbus, OH 43220; 614-457-8600.

Circle 415 on reader service card

Word Processing

WordPerfect 5.1 and 6.0 Updates Keep DOS Going

BY EDWARD MENDELSON

WordPerfect 5.1+ for DOS is a \$49 upgrade that adds new features to WordPerfect 5.1 without requiring users of this classic \$495 DOS-based word processor to forget everything they already know.

The new version transparently reads all files created by WordPerfect 6.0 for DOS and Windows, so offices that use Version 5.1+ on older machines and Version 6.0 on newer ones can share data effortlessly.

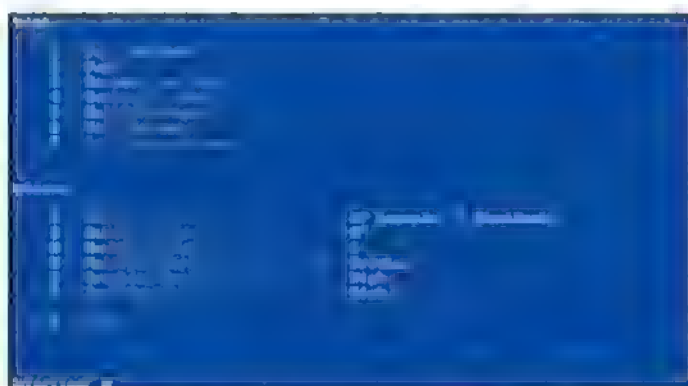
Version 5.1+ also builds in fax support from the Print menu. The program communicates with Class 1 or 2 modems and CAS modems through a terminate-and-stay-resident program sup-

plied in the package.

WordPerfect's already strong file management gets stronger with a List Files screen that can sort by date, time, and size. A conversion program included in the package uses files available on WordPerfect's BBS or the WPFILS forum on CompuServe to convert Microsoft Word for Windows 2.x, Ami Pro 3.x, XyWrite III and 4.0, and other formats.

A special version of Bitstream's FaceLift for WordPerfect comes in the package and supplies high-quality scalable fonts for any dot matrix or HP-compatible laser printer. Also in the package is a special version of Stairway Software's Screen

Extender for WordPerfect, which lets you increase the amount of text on a character-based DOS screen and includes quasi-WYSIWYG screen fonts.



FAX DIRECT: Now you can send a fax from WordPerfect 5.1.

WORDPERFECT 6.0B

Meanwhile, WordPerfect has also shipped WordPerfect 6.0b for DOS, the latest upgrade of its \$495 high-end DOS version. It adds an interactive ruler for setting tabs, margins, and columns in WordPerfect's WYSIWYG view. It also adds auto-fill to the already powerful table feature and improves speed. Although

WordPerfect 6.0 for Windows remains more powerful than WordPerfect for DOS, some features (notably paragraph numbering) are easier to use in the DOS version. Versions 5.1+ for DOS and 6.0b for DOS are both likely to help keep DOS alive for quite a few more years.

• List price: *WordPerfect 5.1+ for DOS*, \$495; upgrade from WordPerfect 4.2 or 5.x for DOS, \$49.95. *WordPerfect 6.0b for DOS*, \$495; upgrade from WordPerfect 6.0, \$17.50.

WordPerfect 5.1+ requires: 640K RAM, 5MB hard disk space, DOS 3.0 or later. WordPerfect 6.0b requires: 386 recommended; 450K RAM, 7MB hard disk space, DOS 3.0 or later. WordPerfect Corp., 1555 N. Technology Way, Orem, UT 84057; 800-451-5151, 801-225-5000; fax, 801-222-5077.

Circle 416 on reader service card

Introducing Delrina WinFax PRO™ 4.0. You'll wonder how you ever faxed without it.



Meet the fastest, easiest, most convenient way ever to handle all your faxing – new Delrina WinFax PRO™ 4.0, the latest version of the best-selling fax software in the world. The only one that combines the advanced faxing features you need with astonishing new ease and usability.

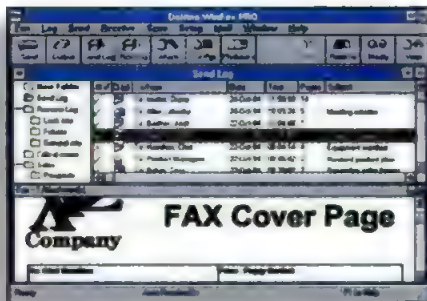
"The best fax package there is."

That's what *PC/Computing* said about version 3.0. And now we've made it even better.

Starting with the revolutionary new streamlined interface that makes it simpler than ever to do anything you'd do with a fax machine, and a lot more. Like sending faxes directly from within any Windows application as easily as

you'd print. Or organizing sent and received faxes in convenient folders. Or converting faxes into word processing documents with OCR.

There's added convenience with dozens of ready-to-use cover pages. Fax phonebooks that are drag-and-drop simple. And improved fax annotation tools that even let you add your signature.



Based on extensive usability testing, the new customizable interface includes folders for organizing sent and received faxes.

Don't try this with a fax machine.

Imagine faxing, not just an image of a document, but the actual file itself*, so it's ready to be used in an application. Imagine sending a single document that is automatically faxed to some people and e-mailed to others.

Now imagine you're on the road, and WinFax PRO automatically forwards faxes to you. Or lets you retrieve faxes sent to your regular fax number*. And there's more.

Get new Delrina WinFax PRO 4.0 today and put faxing where it really belongs – on your PC. Call now for information or to upgrade from WinFax PRO or WinFax LITE™. **1-800-268-6082**

DELTRINA



WinFax, WinFax PRO, WinFax LITE and Delrina are trademarks of Delrina (Canada) Corporation. All other product names are trademarks of their respective owners. © 1994 Delrina (Canada) Corporation. All rights reserved. *Requires Class 1 modem.

CIRCLE 250 ON READER SERVICE CARD

■ Illustration

IntelliDraw 2.0: The Way to Make Your Sketches Smart

BY LUISA SIMONE

The latest release of Aldus IntelliDraw, Version 2.0 for Windows, makes it easier to create drawings that are as dynamic and fluid as the information they contain. This \$199 graphics program can generate diagrams—such as org charts, space plans, network topologies, decision trees, and bar graphs—that respond to new elements or changing data based on underlying logical links. Change the value of a dimension line, and the size of the object with which it is associated changes, too.

Most of Version 2.0's features aren't new, but a new template scheme that mimics Shapeware Corp.'s Visio makes them more accessible. So, as in Visio, you can now use IntelliDraw to create complex diagrams by dragging and dropping objects from a master template onto the current document page. Unlike Visio, however, IntelliDraw's templates contain sample drawings and combinations of prelinked objects in addition to individual clip-art pictures.

For example, in an org chart, new names added to a department are also automatically added to the align/distribute frame that controls their positions on the page. In the space-planning templates, walls are constructed so that they grow in length but never in width. Ultimately, anyone who wants to create either complex or custom links will have to plunge

into dialog boxes that haven't been updated in Version 2.0. For example, the Link Browser's schematic diagrams representing the logical relationship between objects are still difficult to decipher.

NEW EFFICIENCY

Several improvements to the interface increase the program's efficiency. The new floating control palette lets you quickly reposition or resize the currently selected object by entering *x* and *y* coordinates and dimensions. In the same way, the rudimentary animation functions now employ a self-explanatory, VCR-like control panel. There are some cases, however, where changes to the interface remain superficial and don't address the

full-blown drawing programs (such as CorelDRAW), IntelliDraw's perspective and warping are incredibly easy to use and can really jazz up a presentation.

In keeping with the program's spirit of interactivity, the new polymorph function lets you use a slider bar to transform one shape into another. IntelliDraw can also import a wider variety of file formats than Version 1.0 (like QuickTime movies and Photo CD files) or create scanned images on the fly

and server, it still doesn't support the OLE 2.0 spec.

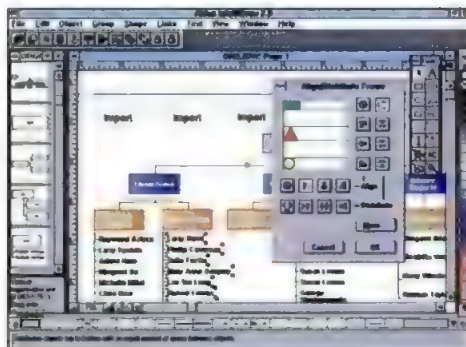
On the whole, this new release is much speedier than Version 1.0. Faster screen redraws make many of the advanced drawing tools (such as Auto Align) more usable.

VERSUS VISIO

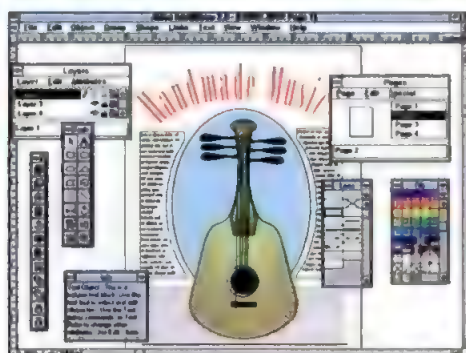
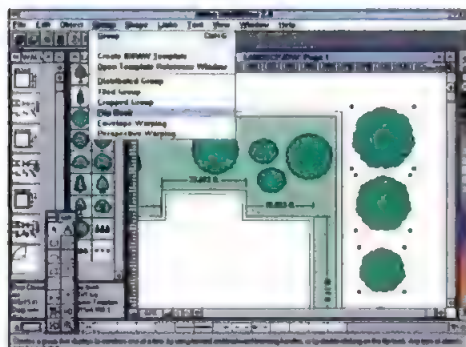
The pivotal question is how well IntelliDraw, Version 2.0, stacks up against Visio. While developing logical and dynamic links between objects in an IntelliDraw document is sometimes a simple task, it is sometimes a major effort. In that way it is analogous to Visio's Shape-Sheets and is intended only for advanced users.

In those instances where important diagrams must be revised constantly, the effort

expended to develop logical and dynamic links can have a big payoff at update time. And where Visio is optimized for black-and-white, laser-printed output, IntelliDraw is broad enough to include artistic touches (like gradient fills and color templates) and alternative presentation options (like the built-in slide show with interactive animation buttons and flipbooks). Ultimately, it's the addition of the drag-and-drop templates that makes Intelli-



INTELLIDRAW now has drag-and-drop templates (above), Flipbooks that make it easy to select from a group of objects (top right), and floating palettes (right).



(via the Twain protocol).

Unfortunately, several of the improvements could stand some improvement. For example, it's great to be able to control word and letter spacing through the PageMaker-inspired dialog boxes, but being able to control text formatting through user-defined text styles would be better. And though IntelliDraw can now function as an OLE client

Draw accessible to average users and a viable competitor to Visio.

• **List Price:** Aldus IntelliDraw, Version 2.0 for Windows, \$199. Requires: 5MB RAM, 6MB hard disk space, Microsoft Windows 3.1. Aldus Corp., Consumer Division, 5120 Shoreham Pl., San Diego, CA 92122; 619-558-6000; fax, 619-490-9232.

Circle 429 on reader service card

Backup the Data Where it's at.

At the corporate network

PowerTape Series 4000



- QIC compatible
- 2 Gigabyte native/4 GB compressed capacity
- Up to 18 MB/minute backup speed
- Includes software, data cartridge and more
- Optional Cheyenne ARCserve for PowerTape*

PowerDAT Series 6000



- Digital Data Storage (DDS) technology
- 2 Gigabyte native/4 GB compressed capacity
- Backs up 300 MB as fast as 30 minutes
- Includes software, data cartridge and more
- Optional Cheyenne ARCserve for PowerDAT*

PowerTape Series 2400



- Quarter Inch Cartridge (QIC) compatible
- 1.2 GB native/4 GB compressed capacity
- Up to 18 MB/minute backup speed
- Includes software and more
- Optional Cheyenne ARCserve for PowerTape*

At the workgroup network

PowerTape Series 1100



- QIC compatible
- 525 MB native/1.05 GB compressed capacity
- Up to 12 MB/minute backup speed
- Includes software and more

Jumbo 500 AVAILABLE EARLY 1994



- QIC compatible
- 255 MB native/500 MB compressed capacity
- Up to 9.3 MB/minute backup speed
- Includes software, minicartridge and more

At the workstation

Jumbo 250



- QIC compatible
- 125 MB native/250 MB compressed capacity
- Up to 9.3 MB/minute backup speed
- Includes software and more

Jumbo 120



- QIC compatible
- 60 MB native/120 MB compressed capacity
- Up to 4.7 MB/minute backup speed
- Includes software and more

On the move

Jumbo Trakker 250



- Parallel port interface
- QIC compatible
- 125 MB native/250 MB compressed capacity
- Up to 8 MB/minute backup speed
- Includes software and more

Jumbo Trakker 120

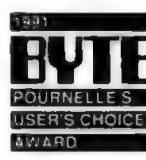


- Parallel port interface
- QIC compatible
- 60 MB native/120 MB compressed capacity
- Up to 4 MB/minute backup speed
- Includes software and more

Optional Accessories



- Colorado Brand tapes
- Colorado Backup for Windows software
- Support for UNIX, OS/2 and Windows NT*
- Controllers to optimize backups
- Compatibility kits



Call for more information and FREE literature
1-800-451-0897
Extension 800



**HP quality
in value-
priced PCs.**

- Intel 486SX, 486DX2 and DX4¹
- Chip upgrades to higher performance
- On-board accelerated local-bus video
- 170-MB hard drive²
- 4-MB RAM, expandable to 64-MB



HP Vectra VL2

- 512 KB or 1 MB of Video RAM standard
- ISA Plug-n-play compliant
- Desktop Power Management
- EPA Energy Star certified
- Local bus Fast IDE hard disk interface³
- 1280 x 1024 video resolution⁴
- Optional 128- or 256-KB cache memory⁵
- Free three-year limited warranty for parts and labor³

from
\$1,099[†]

**The best value
486 PCs in connected
environments.**

- Intel 25-MHz 486SX to 66-MHz 486DX2
- ZIF socket for upgrade to Pentium™ Overdrive⁴
- 4- or 8-MB RAM, expandable to 48-MB
- 170-MB hard drive²
- Slimline or expandable desktop package



HP Vectra 486N and M

- Ultra VGA accelerated local-bus 1024 x 768 video
- Optional integrated 16-bit 10Base-T networking
- Optional Client Management Bundle
- Flash EPROM
- Multilevel security
- Systems Diagnostics Utility
- EPA Energy Star certified on some models
- Automatic setup
- Free three-year limited warranty for parts and labor³

from
\$1,309[†]

**Powerful PCs
for advanced business
communications.**

- Intel 33-MHz 486DX; 50- and 66-MHz 486DX2
- ZIF socket for upgrade to Pentium™ Overdrive⁴
- 8-MB RAM, upgradable to 64-MB
- 240-MB IDE hard drive²
- 128- or 256-KB second level write-back cache



HP Vectra 486XM

- New Ultra VGA2 local-bus 1280 x 1024 video
- 1-MB Video RAM, expandable to 2-MB
- Integrated 16-bit 10Base-T networking
- System BIOS, Video BIOS and setup in Flash EPROM
- SIR Infrared port standard to link HP mobile products
- Systems Diagnostic Utility
- Free three-year limited warranty for parts and labor³

from
\$2,359[†]

**Top performance for
experts in connected
environments.**

- Intel 60-MHz Pentium with 256-KB write-back cache
- One PCI slot, one shared PCI/ISA slot, two ISA slots
- Four mass storage shelves
- 270-MB IDE hard drive with 12-ms access time²
- Integrated S3 928PCI graphics accelerator



HP Vectra XP

- 2 MB of VRAM expandable to 4 MB, 1600 x 1200 video resolution
- 8-MB RAM, expandable to 192-MB
- Integrated 16-bit 10Base-T networking interface with bus-master DMA
- Flash EPROM, Systems Diagnostics Utility
- Asset tracking with non-erasable serial number and customizable PC tattooing
- Free three-year limited warranty for parts and labor³

from
\$4,129[†]



[†]Features included with some models. ¹List price, dealer prices may vary. Monitor not included. ²The DX4-based HP Vectra VL2 PC available in May, 1994. ³Other capacities available. ⁴First year on-site, 24-hour service. Second and third year return to dealer. ⁵When available from Intel. ⁶The HP Vectra N, M, and XM come with MS-DOS® 6.0 and MS Windows 3.1 pre-installed, and the HP Vectra VL2 and XP come with MS-DOS® 6.2 and MS Windows for Workgroups 3.11 pre-installed; HP mouse and keyboard included. MS-DOS is a U.S. registered trademark and Windows is a trademark of Microsoft Corporation. Pentium and Intel Inside logo are U.S. trademarks of Intel Corporation.
©1994 Hewlett-Packard Company PPG402



Need we say more?

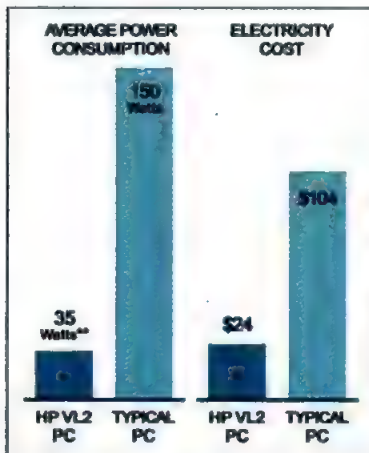
Green PCs that put you in the black.

What our new HP Vectra VL2 PC does for the environment is great. What it can do for your bottom line is astonishing. A thousand of these PCs could save your company \$80,000



a year in electricity bills. That's the kind of green everyone appreciates.

The HP Vectra VL2 can automatically switch from *active* to *standby* or *sleep* modes when not in use. That, combined with savings from our 14-inch Ergonomic 1024 monitor, cuts consumption from a typical 150 watts to 35 watts. Cutting annual energy costs about 75%. With no effect on performance.



So our support of the EPA's Energy Star program is all to the good. Good for the planet. Very good for your profits.

Expand the boundaries of your PC world. With HP's flexible low-end power. Midrange with integrated networking. And high-end processing. All with the features only HP offers.

Our new HP Vectra VL2 comes loaded with everything but a high price. The HP Vectra XM handles advanced business applications and communications with ease. And the new HP Vectra XP is packed with power for scientific calculations or desktop publishing.

Our PCs come with a whole laundry list of features.² But the features that distinguish these PCs from all others won't be found on any spec sheet. They're the reliability and assurance you get from HP standing behind the products they make. No wonder BIS Strategic Decisions has called HP "the fastest-growing PC company in the U.S." Call 1-800-322-HP-PC, Ext. 8088 for more information or for the Hewlett-Packard dealer nearest you.

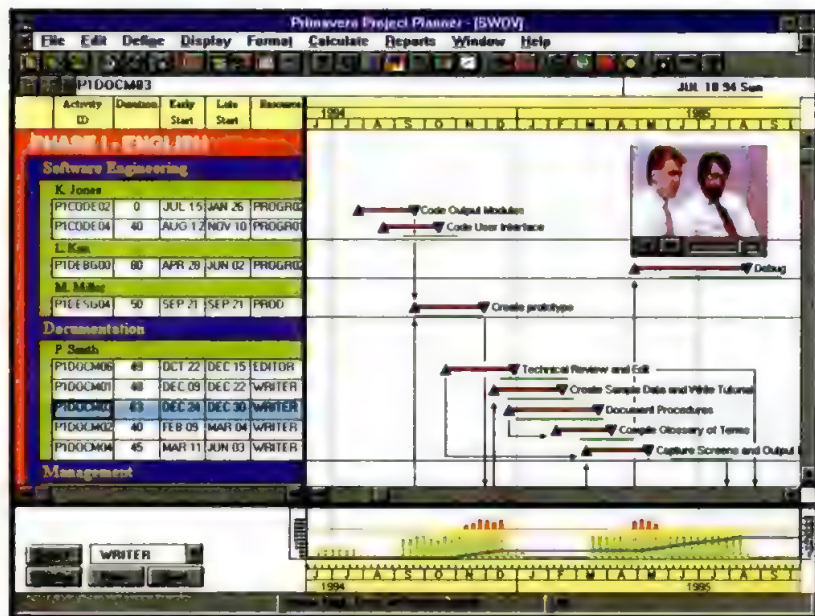


**HEWLETT®
PACKARD**

Annual electricity costs based on PCs (including monitors) running 24 hours a day. **Power consumption of the HP Vectra VL2 and HP 14-inch Ergonomic 1024 display (D2805A) in sleep mode. The HP Vectra VL2 daily usage reflects 3 hours active, 5 hours standby, and 16 hours sleep mode, for an average consumption of 35 watts. Potential annual cost savings based on 1,000 PCs using 35 watts each versus typical PC consumption of 150 watts. Electricity costs of 8 cents/kwh assumed. Actual savings may vary. HP 14-inch Ergonomic 1024 display (D2805A) with Display Power Management System is used in calculation.

Primavera Project Planner.®

Project management software that's so powerful,



Primavera Project Planner gives you unlimited ways to organize and format project information for better on-screen analysis and reporting. No other software uses Windows better for the project manager. Primavera takes full advantage of Windows functionality including drag and drop, Object Linking and Embedding, and more.

Introducing the power to see everything more clearly. To understand what's happening. And to control every detail of the project. Primavera Project Planner for Windows™ is powerful new software, capable of handling the toughest projects, especially in a **SO** multiuser, multiple project environment.

so persuasive,

Now you can communicate clearly, dramatically and professionally with information-rich reports and graphics. Primavera makes it easy to get your point across whether you're talking in **SO** the board room, the lab, the plant or on the job site.

so insightful,

Primavera gives you unlimited ways to analyze your project. You can even organize and summarize by resources and WBS. You'll know the who, what, when, why and how much—and keep your project under control.

you'll wonder how you lived without it.



FREE!
Primavera-in-action video.
Call 1-800-423-0245!

Windows is a trademark of Microsoft Corporation.
CIRCLE 148 ON READER SERVICE CARD



PRIMAVERA

How the world says project management

Two Bala Plaza • Bala Cynwyd, PA 19004
(610) 667-8600 • FAX: (610) 667-7894

See Us at Windows World Booth #8164.

New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

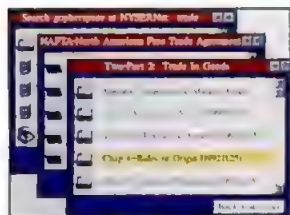
By Adam A. Hicks

NEW & IMPROVED

Windows Interfaces into the Elusive Internet

Computer Witchcraft has created a Windows-based front end, WinNET Mail and News, to provide an off-line program for its Internet service, which lets you access mailing lists (popular special-interest threads) and other e-mail over the Internet via high-speed modems. The service assigns you a simple address, while the folder-based interface makes organizing, sending, and receiving messages less complicated. The only time that you are on-line is when you're uploading and downloading, so if all you need from the Internet is access to mailing lists and the ability to send e-mail, WinNET can handle the job simply and economically.

If you want to do more with the Internet, there is a new Windows-based front end to Gopher, the University of Minnesota's Internet protocol product. WinGopher Complete, a bundle from **Notis Systems**, combines



WinGopher Complete is more friendly than a Unix prompt.

TCP/IP protocol stacks and its WinGopher graphical front end to create a full connection to the Internet. Using a local or national service provider, with a SLIP (Serial Line Internet Protocol) connection, you'll be able to join newsgroups, send e-mail, use searching tools like Archie, Veronica, and WAIS (Wide Area Information Server), perform binary file transfers (FTPs) join Internet Relay Chat (IRC) sessions, and Telnet to other servers.

•WinNET Mail and News, free. Connection to the WinNET Internet Access Service, \$8.00 per hour (monthly minimum, \$9.95). Computer Witchcraft Inc., 330F Distillery Commons, Louisville, KY 40206-1919; 800-589-5999, 502-589-6800; fax, 502-589-7300.

Circle 402 on reader service card

•List price: WinGopher Complete, \$129. Notis Systems Inc., 1007 Church St., Evanston, IL 60201-3665; 800-556-6847; fax, 708-866-4970. Circle 403 on reader service card

HOT PROSPECT



PowerPC Notebook Puts Unix in a 6.9-Pound Box

There has never been a notebook close in performance—or price—to the \$11,995 IBM RISC System/6000 N40 from IBM Corp. It's the first portable system built around the Motorola PowerPC 601 processor and the first that's able to run Unix.

The N40 operates at 50 MHz and comes complete with many high-end components, including a 340MB removable hard disk and support for a minimum of 16MB of RAM (up to a maximum of 64MB). The 6.9-pound notebook has a 9.4-inch TFT (thin-film transistor) active-matrix screen that can handle 256 colors and has video memory to support up to 1,280-by-1,024 resolution. This graphics capability is useful while running IBM's AIX for N40, Version 1.1 (Unix software that has been optimized for the portable). No mouse is required because IBM includes the TrackPoint II pointing device. Internal battery life is rated at only 45 minutes, but with optional external packs you can get up to 4 hours.

Numerous ports are provided for a mouse, a keyboard, Ethernet network support, PCMCIA adapters (which will provide Token-Ring network connectivity), and AppleTalk printers. The system will also eventually support ISDN.

•List price: IBM RISC System/6000 N40, \$11,995. IBM Corp., Old Orchard Rd., Armonk, NY 10504; 800-426-2255. Circle 401 on reader service card

IMPROVED

A Kinder, Gentler Access 2.0

Microsoft Corp. has brought its expertise in usability testing to Microsoft Access, Version 2.0. The new version of the database management program is easier to use at every level.

New Wizards, including Table and Query Wizards, will help you create a table from scratch or help you pull information from an existing table with simple point-and-click options. The toolbar closely matches that of other Microsoft products, and the program has picked up features of other Microsoft apps, such as the "best-fit" column commands familiar to Excel users.

Access 2.0 is fully OLE 2.0-compliant, enabling seamless sharing between applications, documents, and data. The power user will be interested in advanced top-end queries. You can link the tables using a Control Wizard that takes care of the background programming for you.

Even though many enhancements focus on ease of use, Version 2.0 is still a powerful developer's tool that now includes programmable security, SQL pass-through, and cascading updates and deletes (which keep only related data and discard unused data as records are added and deleted).

All users benefit from Rushmore optimization (borrowed from FoxPro), which queries only the most relevant data in each record set. That translates into shorter search times.

•List price: Microsoft Access, Version 2.0, \$495. Microsoft Corp., One Microsoft Way, Redmond, WA 98052-6399; 800-426-9400, 206-882-8080; fax, 206-883-8101.

Circle 404 on reader service card

NEW

Talk Is Cheap with Verbex Voice Recognition Software

Voice recognition may not be worth a big investment, but at \$99, a little experimentation may pay off. **Verbex Voice Systems'** Listen for Windows 1.2 can learn voice commands for 12 well known programs including AutoCAD 12, Quicken, and software suites from Lotus and Microsoft. (If you use WordPerfect 6.0 or PageMaker 5.0, however, you'll

New & Improved

have to buy separate packages from other vendors.) Version 1.2 requires a 486/66 or Pentium processor and a sound card. Listen for Windows is compatible with Creative Labs' Sound Blaster Pro, Media Vision's ProAudio Spectrum, and Microsoft Sound System. A bundle with a headset microphone or mountable microphone is available for \$139 if you don't have one already.

• List price: *Listen for Windows, Version 1.2*, \$99 (software only). *Verbex Voice Systems Inc.*, 1090 King Georges Post Rd., Bldg. 107, Edison, NJ 08837-3701; 800-275-8729, 908-225-5225; fax, 908-225-7764.

Circle 405 on reader service card

IMPROVED

Adaptec Simplifies SCSI Again

If the recent release of **Adaptec's** EZ-SCSI 2.0 didn't solve all your SCSI problems, a new Windows interface and support for a larger number of devices in EZ-SCSI 3.0 is already here to help. There's new hardware support for tape and Floptical drives, as well as HP scanners and CD jukeboxes under both DOS and Windows. Adaptec also has a tutor utility, SCSI-Tutor, to answer questions about SCSI terms and other commonly asked SCSI questions. Adaptec also incorporates backup software from Arcada Software, makers of Backup Exec.

• List price: *Adaptec EZ-SCSI, Version 3.0*, \$75. Upgrades for registered users of other Adaptec SCSI products, \$29. *Adaptec Inc.*, 691 S. Milpitas Blvd., Milpitas, CA 95035; 800-442-7274, 408-945-8600; fax, 408-262-2533.

Circle 406 on reader service card

NEW

Get a Grip on Your Debts

The Debt Analyzer for Windows from **Insight Software Solutions** offers a new way to look at your finances using the tools of bankers and debt counselors.

The package organizes all your debts and creates the best payment schedule for fastest debt reduction. Moreover, it allows you to see the difference in interest you'll pay if you stick to the monthly minimums or make extra payments along the line. You enter data in terms of type of debt and calculate interest rates (daily, monthly, APR). From there, you're able to generate reports, schedules, charts, and summaries for viewing and printing.

• List price: *The Debt Analyzer for Windows*, \$25. *Insight Software Solutions*, P.O. Box 354, Bountiful, UT 84011-0354; 801-295-1890; fax, 801-299-1781.

Circle 407 on reader service card

BRIEFS

Monitors

Samsung Electronics America adds another product to its SyncMaster series with the SyncMaster 3Ne, a 14-inch SVGA color monitor priced at \$359. The monitor has a maximum display size of 10.8 by 8.1 inches with a maximum resolution 1,024-by-768 noninterlaced at 60 Hz. It comes with a two-year warranty. 800-726-7864, 201-229-4044.

The **MITAC** Division of Synnex Information Technologies has released two new monitors, both backed by a two-year warranty. 800-777-1688, 510-656-3333.

The Advantage M1450PD, MITAC's low-priced SuperVGA 14-inch monitor, has an automatic idle mode to help it comply with the EPA's Energy Star standards. The Advantage has a 1,024-by-768 noninterlaced resolution, a maximum refresh rate of 50 Hz, and is priced at \$339.

The 15-inch XGA and SuperVGA, MITAC Performance M1564PD monitor, aimed at professional markets, features flicker-free operation and a 76-Hz refresh rate at 1,024-by-768 resolution. The monitor will also support 1,280-by-1,024 and is priced at \$499.

Hardware

Advanced Digital Information Corp.'s DDS-2 1200D DAT Autochanger has twice the capacity and speed of the DDS-1 DAT Autochanger. Storage on the new model averages 96GB, but with optimal compression it will reach the 192GB range. Using 120-meter tapes, the unit will randomly access a file in the magazine in less than 40 seconds. The autochanger is compatible with popular tape backup software. Priced at \$9,500. 800-336-1233, 206-881-8004.

Philips has announced it will ship the first CD-ROM drive (the CM207) to fully support the IDE/ATAPI interface protocol. Using IDE you'll be able to see average access times of 325 milliseconds. This will enable you to connect the CD-ROM drive directly to your system without requiring a separate interface card.

IMPROVED

Doc-To-Help Gets Better Hypertext and Word 6.0 Support

If you're adding a Windows help system and manuals to the program you've developed or if you've just been handed the responsibility of creating the company's training manual either on-line or in print, **WexTech Systems'** Doc-To-Help will ease the task. The latest version, 1.6, adds full compatibility with Microsoft Word for Windows 6.0 and a group of new utilities called Hyperformance Tools, which assist you in publishing printed documentation or professional-quality hypertext on-line help. For added ease of use, Doc-To-Help has a feature called The Navigator, which displays file structures and enables drag-and-drop creation of context-sensitive help. Meanwhile, the Setup Wizard walks you through the process of creating an installation program for document distribution. Version 1.6 also supports better graphics, including 256-color bitmaps that can be used as watermarks on the screen.

• List price: *Doc-To-Help 1.6*, \$295. *WexTech Systems Inc.*, 310 Madison Ave., #905, New York, NY 10017; 212-949-9595; fax, 212-949-4007.

Circle 434 on reader service card

NEW

Summagraphics Creates Cordless Pen That Responds To Pressure

Summagraphics Corp.'s

SummaSketch FX series of tablets feature the SmartPen, which provides 256 levels of

pressure sensitivity to give you

just the right touch as you draw. You set the the sensitivity of the cordless three-button stylus for finer control or wider strokes. The SummaSketch FX has a resolution of 2,540 dots per inch and ships with drivers for AutoDesk Device Interface, WINTAB, and Microsoft Windows 3.1. You also get the TABLET.COM driver for Microsoft Mouse emulation.

• List price: *SummaSketch FX with pressure stylus*, 12- by 12-inch tablet, \$649; 18- by 12-inch, \$1,149. *Summagraphics Corp.*, 60 Silvermine Rd., Seymour, CT 06483-3907; 800-337-8662, 203-881-5400; fax, 203-881-5367.

Circle 435 on reader service card



THE PLANET'S HOTTEST HARDWARE MEETS THE PLANET'S COOLEST SOFTWARE. INTRODUCING GAME BLASTER CD 16.

All the leaders of the gaming universe have joined forces. And now they're coming to get you. No other game experience can prepare you for what's waiting inside the new Game Blaster CD™ 16 multimedia upgrade kit.* You get a Sound Blaster™ 16-bit sound card and speakers that make all your games sound terrifyingly real. A double-speed CD-ROM, so all your games run

faster. An FX-2000 joystick, so you can hone your reflexes. Not to mention the

most outrageous games in the cosmos—Rebel Assault and Sim City 2000—and for the next six months, no other kits have them. But that's not all. Game Blaster also includes Return to Zork, Iron Helix, F-117A Stealth Fighter, Silent Service II, Civilization, Railroad Tycoon, and Grolier's Multimedia Encyclopedia. Of course, all your games will sound better because they're made to be played on Sound Blaster. The question is, can you handle it? Want more info or the name of a Creative Labs dealer? Call 1-800-998-5227.



CREATIVE
CREATIVE LABS, INC.

*Suggested Retail Price \$549.95 ©1994 Creative Technology Ltd. Game Blaster CD, Sound Blaster, and the Sound Blaster and Creative logos are trademarks of Creative Technology Ltd. All other trademarks are the property of their respective owners. U.S. inquiries: Creative Labs 1-800-998-5227 or 408-428-6600. International inquiries: Creative Technology Ltd, Singapore, TEL: 65-773-0233 FAX: 65-773-0353.
CIRCLE 066 ON READER SERVICE CARD



Introducing Omni Precisely what you'd expect

The world's most advanced OCR.

If OmniPage® Professional broke the mold for OCR, then OmniPage Professional 5.0 promises to be nothing short of revolutionary. Professional 5.0 represents the biggest technological breakthroughs ever pioneered by Caere. Advancements that push our level of OCR accuracy to new heights. Increase ease of use and flexibility. And expand feature capabilities beyond any previously offered. Now at a price you can afford.

Recognize more.

For the first time in the history of OCR, you can now get full page retention of any document—even those with text and images—without losing the document's original format. It's made possible with Professional 5.0's True Page™ which offers true page-based display and access capabilities. So what you see on the printed

page is what you'll see after your document is recognized. What's more, you'll have immediate access to your data and images.

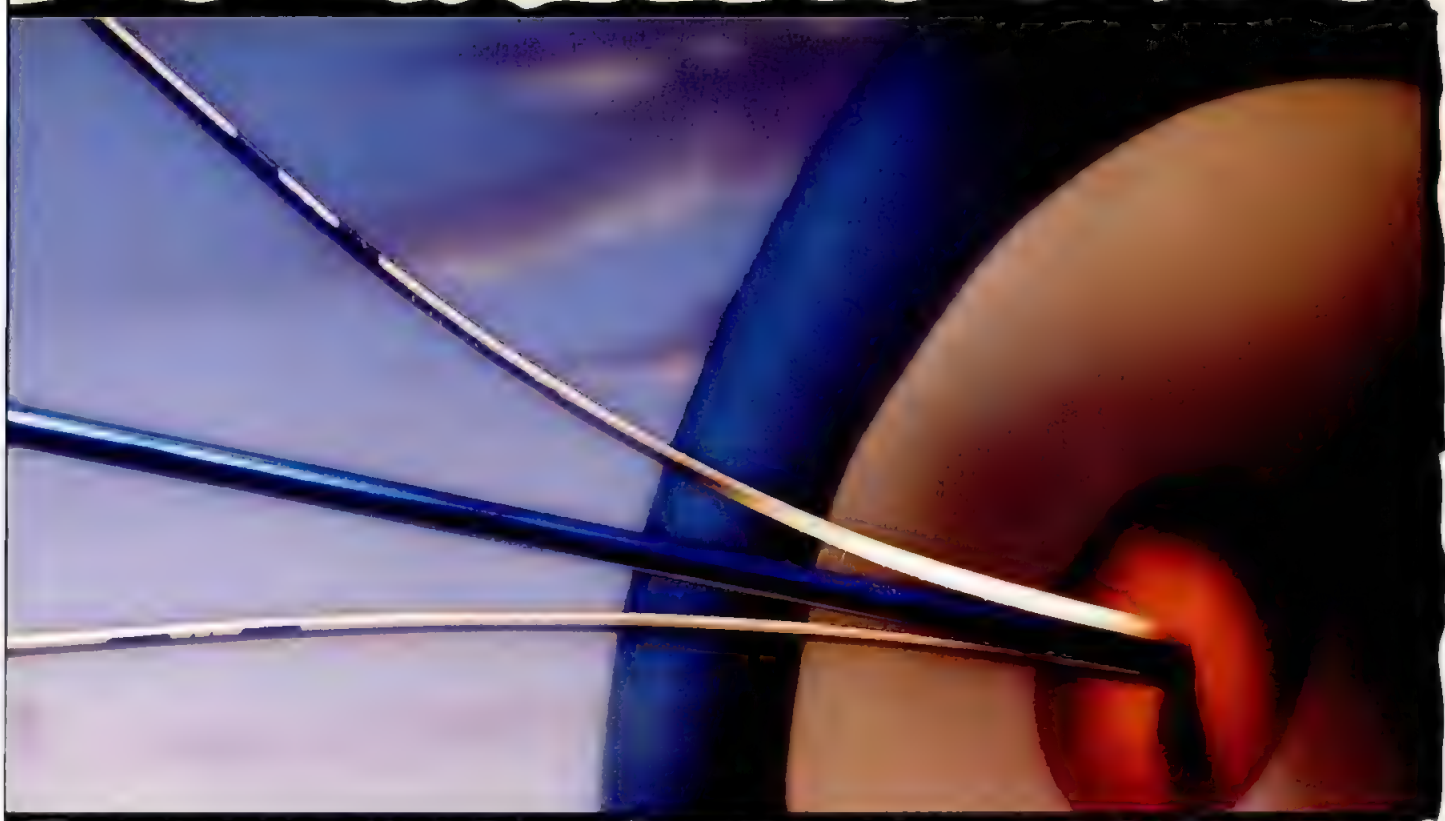
Use the new WYSIWYG Text Editor to easily edit and manipulate text. Or enhance images with an integrated 24-bit color image editor. It's never been easier to recognize, proof, or modify a printed document.

Get more accomplished.

In the past, OCR users had to follow a rigid and often time-consuming sequence of steps to scan, recognize, and save a document. Now with Professional 5.0's Dynamic Access Panel™ you can work in a style that's convenient for you. The panel's intuitive interface is designed for maximum workflow flexibility. The click-and-choose functionality allows you to modify your workflow, even in the middle of a job. Professional 5.0 also allows you to save and customize zone templates to use with similar documents in the future. And its improved training capabilities mean you can "teach" it to recognize



For Your Information.



Page Professional 5.0. Cut from the leader in OCR.

more custom characters than ever before. In addition, Professional 5.0 contains all the easy-to-use features you've come to expect from the leader in OCR, including:

- Custom character recognition
- Deferred processing
- 24-bit color image editor
- Recognition of 11 languages
- Scans fonts from 6-72 points
- TWAIN support
- HP AccuPage™ technology 2.0 support

Redefining OCR Accuracy

Professional 5.0's advanced accuracy is made possible by Caere's recent technological breakthroughs. To begin with, Caere has taken its award winning OCR to a new level with 3D OCR.

3D OCR is a revolutionary technology that uses full gray images for the first time. Professional 5.0 is able to view the "depth" of each character pixel, so it can be used as additional "data" in the recognition

process. OmniPage also includes a new compound neural network to help with extra tough pages like faxes. In addition, Professional 5.0 features the Language Analyst™, a sophisticated language checker which eliminates many OCR errors.

So whether your documents contain a challenging layout, images, or low resolutions, you can count on Professional 5.0 to give you precisely what you're looking for.

To get your copy of OmniPage Professional 5.0, or learn about the new OmniPage 5.0 or OmniPage Direct, see your local Caere dealer or call us for more information at 1-800-535-SCAN.

omniPAGE
PROFESSIONAL



CIRCLE 097 ON READER SERVICE CARD

Caere and OmniPage are registered trademarks of Caere Corporation. The Caere logo, True Page, Dynamic Access Panel, and Language Analyst are trademarks of Caere Corporation. All other trademarks are of their respective companies. ©1993. All rights reserved.

New & Improved

IMPROVED

SPC Sticks to the Fundamentals With Its DOS Word Processor

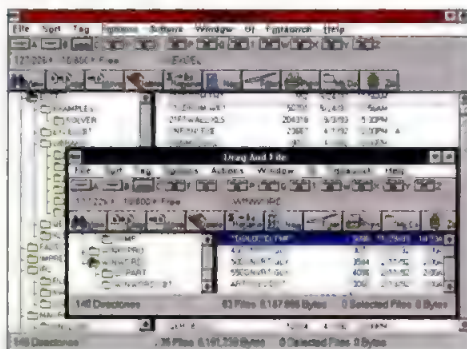
Things have been quiet at **Software Publishing Corp.**'s word processing division for a while, but now Professional Write 3.0, the latest version of SPC's DOS-based word processor, has entered the marketplace. You'll find expanded mouse support, redesigned menus, and the ability to execute DOS commands without exiting the program. To a power user, features like true tabs, expanded point sizes (now from 6 to 144 points), and the ability to see a layout mode may not seem exceptional, but this no-frills package can get the job done for the average DOS word-processor user who doesn't want to kern or do baseline shifts.

• List price: *Professional Write 3.0*, \$249; upgrade from previous version, \$65. **Software Publishing Corp.**, 3165 Kifer Rd., P.O. Box 54983, Santa Clara, CA 95056-0983; 800-234-2500, 408-986-8000; fax, 408-980-0729. Circle 408 on reader service card

NEW

Canyon Software Has a One-Stop Drag-and-Drop Solution

Canyon Software has combined two of its Windows utilities, Drag and View Plus and Drag and Zip, in its latest release, Drag and File. The resulting program is full-featured enough to copy, move, view, compress, and drag-and-drop files. In a Windows environment you get a file manager that does more than your Windows File Manager, including the ability to compress files without leaving Windows. You can display your directories in up to 12 Drag and File windows to compare files and easily drag and drop between them. You can also display and scroll between multiple files from a single window, or you can create a new window



Drag and View Plus lets you open multiple windows for management and viewing.

BRIEFS

Hardware

The price is expected to be about \$199. 800-777-1688, 719-593-7900.

Capture your brainstorm on a whiteboard using SMART WriteBoard from **Smart Technologies**. No longer do you have to delay a meeting to copy notes. You simply download what you've drawn in pen on the touch-sensitive screen to a PC or Sun SPARCstation running Unix. The whiteboard is able to distinguish different colors using a pen tray, and the images from the whiteboard are saved in bitmapped formats for later use and editing. List price: \$2,995. 403-233-9333.

Kantek has found way for you to keep others from reading your laptop over your shoulder when you work in public places. Secure-View is a notebook filter that, once placed on the screen, blurs all but a direct frontal view of the screen. When you're using Secure-View, someone sitting next to you on a plane won't be able to see what you have on your screen. Designed as a one-size-fits-all gadget in a durable plastic frame, the Secure-View screen filter is priced at \$119. 800-536-3212, 516-593-3212.

Software

Adobe Systems is shipping Adobe Premiere 1.1 for Windows, which now includes video-editing software. The upgrade, offered free to users of Version 1.0, steps up the file-format support with Targa and ADPCM. Now you can specify custom date rates to optimize CD-ROM playback, play back imported still images as continuous video clip, and select color palettes to generate consistent colors throughout a movie. List price: \$295. 800-833-6687, 415-961-4400.

An upcoming version of Common Ground for Windows from **No Hands Software** will be closely integrated with Lotus Notes, Release 3. Notes users will now be able to distribute documents over a network without worrying about file formats and conversion problems at the other end. Notes/FX automatically incorporates Common Ground files into a Notes database, making it possible for the

for each viewed document.

• List price: *Drag and File*, \$69.95. **Canyon Software**, 1537 Fourth St., #131, San Rafael, CA 94901; 415-382-7999; fax, 415-382-7998. Circle 409 on reader service card

NEW

Suite Deal on Comm Software from Phoenix

Calling its new communications software bundle The Phoenix Ultimate Communications Suite may be an understatement for **Phoenix Technologies**. This group of five products handles all your fax (Eclipse Fax), remote communications (The Norton pc-Anywhere), e-mail (E-Mail Connection), online (America Online), and modem (Terminal Plus) needs for a terrific price. All the included packages are top competitors in their categories, so until a single integrated package that can satisfy all your communications requirements comes along, a bundle like this may be the way to go.

• List price: *The Phoenix Ultimate Communications Suite*, \$99. **Phoenix Technologies Ltd.**, 846 University Ave., Norwood, MA 02062-3950; 800-452-0120, 617-551-4000; fax, 617-551-3750. Circle 410 on reader service card

IMPROVED

Platinum Software Strengthens Its Core Accounting Modules

On the heels of Platinum 3.0's designation as Editors' Choice ("The Price Waterhouse Report: LAN-Based Accounting at the Crossroads," October 26, 1993), **Platinum Software Corp.** has added new features to Version 4.0 of its high-end accounting system.

The Inventory module is a more robust transaction-based system that maintains detailed audit trails, tracks an unlimited number of user-definable operations, and has tighter ties to the Manufacturing module. Accounts Payable and Accounts Receivable give you more flexible analysis with new user-definable topics, 32-digit account codes for line entry, and better gross profit and distribution reporting.

• List price: *Platinum, Version 4.0, core modules*, \$1,295 each; upgrade for users of 3.0 with maintenance contracts, \$175 per module; without contract, \$350. **Platinum Software Corp.**, 15615 Alton Pkwy., #300, Irvine, CA 92718; 800-999-1809, 714-727-1250; fax, 714-727-1255. Circle 411 on reader service card

The ZEOS[®] Ambra:[™] There's No Other System Like It!

AFFORDABLE, UPGRADABLE AND COMPLETELY COMPATIBLE

ZEOS Ambra computers are not just another line of systems. They're the ultimate node or ideal home office computer. Why ultimate and ideal? What's new?



On-board local bus video, larger system cache, larger hard drives, and you now have the option of a

486SX, 486DX or 486DX2 microprocessor. What's more, our incredible new lower prices make ZEOS Ambra systems more affordable than ever!

To give you the best value, we offer money-saving packages that include quality ZEOS components and choice extras. Standard are an upgradable Intel CPU, 128K SRAM cache for faster data access, and enough bays to add a CD-ROM, 5.25" floppy and tape backup. Plus, five expansion slots including two VESA local bus. All this in a space-saving slim case. Of course, we'll also custom-build a system to your exact needs—choose from many affordable options including modems, networking cards and more.



And the Ambra is ideal for networking. It's 100% compatible with every major network operating system on the market, including Novell NetWare. Getting connected is a breeze!



It's the little powerhouse that's also great for word processing or intense spreadsheets. Whether it's plugged into your network or plugging away at the home office, ZEOS Ambra computers are the sensible systems that won't cramp your style or take a bite out of your wallet. Call your Systems Consultant at 800-554-7172.

AWARD-WINNING SERVICE & SUPPORT

Many companies talk about service, but at ZEOS, our customers do the talking. ZEOS has won more *PC Magazine* Readers' Choice for Service & Reliability awards than any other company—five in all!



We're here for you 24 hours a day, 365 days a year, and always a toll-free call away. ZEOS systems come with a One Year Limited Warranty, Express Parts Replacement and a 30-Day Money-Back Guarantee.

STANDARD WITH EVERY ZEOS AMBRA SYSTEM:	PACKAGE 1	PACKAGE 2
■ Genuine Intel 486 microprocessor. ■ Intel's Pentium™ OverDrive™ upgrade socket. ■ 128K SRAM cache. ■ Two serial ports, one parallel port and one mouse port integrated on the motherboard. ■ Five expansion slots: two VESA local bus and three 16-bit ISA. ■ Small footprint case with four bays. ■ System speed is selectable through the keyboard. ■ 200 watt power supply, switchable between 115/230V. ■ ZEOS 101-key space-saving keyboard. ■ Password feature built-in ROM for security. ■ FCC Certified Class B; UL Listed. ■ Complete ZEOS Customer Satisfaction Package.	■ 486SX-25 \$1195 Lease: \$50/month ■ 486DX-33 \$1395 Lease: \$59/month ■ 486DX2-50 \$1495 Lease: \$63/month ■ 486DX2-66 \$1595 Lease: \$68/month ■ 4MB RAM ■ 214MB IDE hard drive with built-in 32K cache ■ 3.5" 1.44MB floppy drive ■ On-board VESA local bus SVGA color video ■ ZEOS 14" 1024 x 768 SVGA color monitor, 28mm dot pitch ■ Microsoft Mouse ■ Microsoft DOS 6.2 with Enhanced Tools ■ Windows for Workgroups 3.11	■ 486SX-25 \$1395 Lease: \$59/month ■ 486DX-33 \$1595 Lease: \$58/month ■ 486DX2-50 \$1695 Lease: \$61/month ■ 486DX2-66 \$1795 Lease: \$65/month ■ 8MB RAM ■ 340MB IDE hard drive with built-in 128K cache ■ 3.5" 1.44MB floppy drive ■ On-board VESA local bus SVGA color video ■ ZEOS 14" 1024 x 768 SVGA color monitor, 28mm dot pitch ■ Microsoft Mouse ■ Microsoft DOS 6.2 with Enhanced Tools ■ Windows for Workgroups 3.11

Fax Orders: 800-362-1205 or 612-362-1205. Phone orders: Government: 800-245-2449, Outside U.S. and Canada: 612-362-1212. Purchase Orders, MasterCard, VISA, Am Ex, Discover, Z-Card,™ COD and affordable leasing programs. Open 24 Hours a Day, 365 Days a Year!

CALL NOW TOLL FREE
800-554-7172

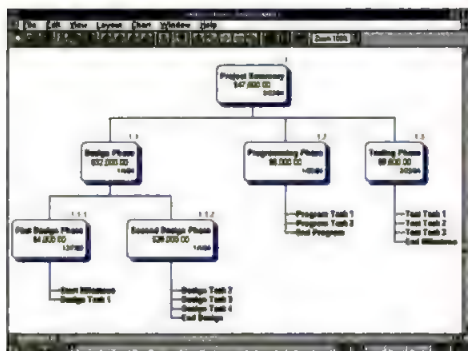
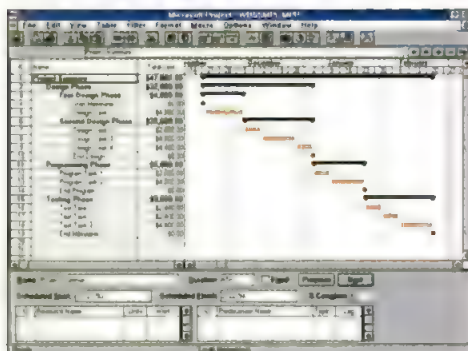


Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 36-month lease, 48, purchase price. All prices, specifications and availability are subject to change without notice. Call to confirm these and country details. Prices do not include shipping. Need compatibility? A Developer Brand Only. Need more on security with respect to these products. All products and company names are trademarks or registered trademarks of their respective holders. Intel Inside is a trademark of Intel Corporation. ZEOS is a registered trademark. Z-Card and Computer Year are registered trademarks. Ambra is a trademark of ZEOS International Ltd. © 1994 ZEOS International Ltd. 038 International Work. Minneapolis, MN 55421 USA. ZEOS is a publicly traded company (NASDAQ) symbol: ZEOS.

NEW

Add-On to Microsoft Project Makes You Top of the Charts

Microsoft Project can't present your current project in a Work Breakdown Structure (WBS) chart (which displays the hierarchical structure of a project), but that doesn't mean you have to go outside of Project to get the job done. Instead, WBS Chart for Project, from **Jim Spiller and Associates**, works as an add-on to Project and appears under the File menu. Using the same data you'd normally enter for a Gantt chart in Project, WBS Chart breaks down the outline into groups of tasks and corresponding subordinate tasks. You end



Your Microsoft Project 3.0 chart before (above) and after (below) WBS Chart.

up with a top-down view of the relationships within the project you've created. Once your data has been entered, you can manipulate the display to see an overview of a plan or specific details associated with a given task. The package is an add-on but operates as an independent executable, which will allow you to save the project for future editing or print (either to one page or in tiled sections) to any Windows-compatible printer.

• **List price:** *WBS Chart for Project*, \$149. **Jim Spiller & Associates**, 3256 Seminole Circle, Fairfield, CA 94533; 707-425-2484; fax, 707-425-3080.

Circle 412 on reader service card

BRIEFS

Software

documents to be searched, retrieved, viewed, or printed exactly as they were when they were created. 800-598-3821, 415-802-5800.

Transportation Concepts and Services has software to help you get your Federal Express invoices electronically. The \$695 program is designed to do more than just track invoices without paper. You can actually generate reports on packages not delivered on time. Submit the list from the program and you'll get a refund from Federal Express. 908-548-1200.

Pentax Technologies Corp. has released Version 2.0 of the DS6 and DS10 Scanner Driver. This new driver increases resolution on both scanners to 600 by 600 dots per inch in 1-dot-per-inch increments using interpolated algorithms that will work in black-and-white, dithered, or gray-scale mode. The driver is free to those with the older version if they call 800-543-6144 or 303-460-1820.

And Finally...

IBM Corp. heads into the peripheral market, announcing its Options line of peripherals and accessories for the commercial market. All will be industry standard. . . **Compaq Computer Corp.** announced a strategy to target schools both for mass sales through resellers (Compaq Certified Education Partners) and other marketing channels. The announcement included an agreement with Jostens Learning Corp. . . **Compton's New Media** has dropped pricing on its flagship Compton's Interactive Encyclopedia for Windows from \$395 to \$149.95. . . **Quantum Corp.** has announced a price increase of 3 to 5 percent for their new ProDrive LPS 170/340 and 270/540 drives designed for desktop personal computers. The increase is attributable to large demand from its OEM customers. . . **TCO**, the Swedish Confedation of Professional Employees—promoters of Video Display Terminal safety—has opened an information center in Chicago to inform and assist the U.S. on the testing procedures it follows. You can reach it at 312-781-6223.

NEW

New Paradigm Offers A Way to Share

You may not be able to afford to just run out and buy **New Paradigm Software Corp.**'s first software offering, *Copernicus*, but it's still worth a look. New Paradigm wants to change the way you evolve from your legacy systems to client/server software by eliminating the need to completely restructure data or create single-purpose data gateways.

Copernicus resides on a file server on your network and acts as a data translator for file exchanges between different platforms. For example, *Copernicus's* Application Data Interchange (ADI) allows you to take information that resides on a mainframe and translate it into a format for the PC. The data is exported in its native format and then gets translated and transferred by *Copernicus* into the appropriate format for the destination program.

The package currently supports either HP UX Unix servers and Windows clients and is scheduled to include support for other systems, such as OS/2 and Macintosh, in the future. If you're responsible for integrating data from systems that seem like they will never be able to exchange one byte of data, *Copernicus* may save you the time and expense of completely rewriting code.

• **List price:** *Copernicus*, \$25,000 to \$100,000. **New Paradigm Software Corp.**, 335 Madison Ave., 11th Floor., New York, NY 10017; 212-557-0933; fax, 212-557-0935.

Circle 413 on reader service card

NEW

Adding onto Print Shop, CD-ROM Style

Print Shop was originally released by **Broderbund Software Inc.** in 1984 to turn graphics and text into greeting cards, stationery, and banners.

Now, ten years later, *Print Shop Deluxe CD-ROM Ensemble* combines all five of today's *Print Shop* products into one giant collection that includes over 1,000 graphics, 73 scalable and stretchable TrueType fonts, and templates that you can use for everything from business cards to banners.

• **Approximate price:** *The Print Shop Deluxe CD Ensemble*, \$80. **Broderbund Software Inc.**, 500 Redwood Blvd., P.O. Box 6121, Novato, CA 94948-6121; 800-521-6263, 415-382-4600; fax, 415-382-4419.

Circle 414 on reader service card

Introducing Proxima's Portable 10-Foot Monitors

With Proxima's desktop projection products, you can now project computer and video images as large as 25 feet! And that means you can take advantage of the productivity-enhancing power of your personal computer to make your presentations, business meetings, training, and interactive workgroup sessions more effective.

Simply connect a Proxima Desktop Projector™ to your PC or Mac and instantly deliver dynamic color graphics...crisp data...brilliant video. Or place one of our LCD projection panels on an overhead

projector, plug it into your computer, and—presto!—the benefits of the giant screen are yours.

From our MultiMode® and active-matrix Ovation™ projection panels to our dazzling new Desktop Projectors and our remarkable Cyclops® cordless-mouse pointer, Proxima has created a whole new way to showcase your ideas and imagination—starting at less than \$1,600!

So call us for more information.



PROXIMA®

PROJECTING THE POWER OF YOUR COMPUTER IN THE MEETING ROOM.™

CIRCLE 140 ON READER SERVICE CARD

CALL NOW TOLL-FREE
1-800-447-7694



IF AN URGENT E-MAIL LANDS IN YOUR MAILBOX AND YOU'RE NOT THERE TO READ IT, DOES IT MAKE ANY NOISE? YOU BET. IT'S THE SAD SOUND OF DEADLINES BREAKING, THE BALL DROPPING, HAIR BEING PULLED OUT BY THE ROOTS. IT'S THE GIANT SUCKING SOUND OF YOUR CAREER GOING DOWN THE TUBES.

WELL. MAYBE IT'S NOT THAT BAD.

BUT IT WOULD STILL BE PRETTY GREAT

TO BE ABLE TO CHECK YOUR E-MAIL

FROM ANYWHERE. AND NOW YOU CAN.

INTRODUCING CC:MAIL® MOBILE FOR

WINDOWS™ — IT'S THE SAME PRODUCT

AS THE CC:MAIL YOU HAVE ON THE

LAN — SAME POWERFUL FEATURES, SAME

FRIENDLY INTERFACE — WITH THE ADDED

BENEFIT OF GOING EVERYWHERE YOU GO.

SO THE URGENT MESSAGE YOU RECEIVE

MONDAY MORNING GETS READ MONDAY

MORNING — WHETHER YOU'RE IN TOPEKA,

TASMANIA OR ANYWHERE IN BETWEEN. YOU DON'T MISS A THING. AND THEY DON'T CURSE YOU BACK AT THE HOME OFFICE.

BECAUSE YOUR TIME IS PRECIOUS ON THE ROAD, LOTUS® CC:MAIL MOBILE FOR WINDOWS LETS YOU BE MORE SELECTIVE ABOUT

THE MESSAGES YOU VIEW. AN AUTOMATED MESSAGE SUMMARY DIALOG BOX LETS YOU SEE THE AUTHOR, DATE, TIME, SUBJECT,

SIZE AND ESTIMATED DOWNLOAD TIME OF EVERY MESSAGE, SO YOU CAN ACCEPT ONLY THE MESSAGES YOU NEED RIGHT NOW.

WHILE YOU WERE
OUT YOU RECEIVED
142 E-MAIL
MESSAGES WHICH
WERE URGENT YESTERDAY.
WELCOME BACK

AND YOU CAN PRE-CONFIGURE CC:MAIL MOBILE TO SIMPLIFY YOUR MOBILE MESSAGING. ESTABLISH LOCATION PROFILES FOR THE PLACES YOU FREQUENT—WITH ONE CLICK YOU'RE SET TO CALL IN FROM THE FIELD OFFICE. ANOTHER CLICK, YOU'RE RECONFIGURED TO CALL FROM HOME. CC:MAIL MOBILE EVEN HAS A WIRE-

LESS SETTING SO YOU CAN KEEP SENDING AND RECEIVING MESSAGES EVEN WHEN YOU'RE NOT WITHIN REACH OF A PHONE.

YOU CAN FURTHER AUTOMATE YOUR CC:MAIL TO SEND AND RECEIVE MESSAGES AT A SET TIME OR A REGULAR INTERVAL. LOTUS CC:MAIL MOBILE FOR WINDOWS EVEN LETS YOU STORE MULTIPLE MESSAGES IN THE OUTBOX AND SEND THEM ALL AT ONCE, REDUCING YOUR CALLING COSTS.

BASICALLY, LOTUS CC:MAIL MOBILE FOR WINDOWS IS THE COMPREHENSIVE

SOLUTION TO

A BIG PROBLEM—HOW TO STAY IN TOUCH

WITH YOUR BUSINESS WHEN YOU'RE OUT OF THE OFFICE—AND IT'S AVAILABLE RIGHT NOW (THERE'S ALSO A DOS VERSION AND ONE FOR THE MAC® AS WELL). JUST STOP BY YOUR LOTUS AUTHORIZED RESELLER OR CALL 1-800-448-2500 FOR MORE INFORMATION.

Lotus
Working Together™



The success of AutoCAD has inspired dozens of cheap imitations.

If you need a CAD package but don't need all the sophistication of AutoCAD® software, don't settle for a cheap imitation. Get new AutoCAD® LT for Windows.* Unlike those "bargain" packages, it's based on the world standard—AutoCAD—and gives you features the others can't duplicate. Like more accurate 2D drawing tools for designing

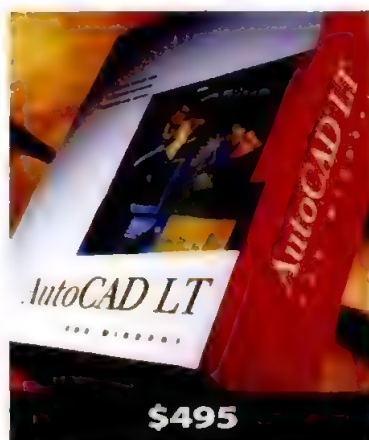
discrete parts, 3D design and layout tools and full support for layers and blocks. And drawings you can link, so changes on the master are automatically reflected in other drawings. What's more, making these drawings is as easy as using a few simple icons and tools. But if you do find

yourself with a question, you'll have access to on-line help as well as free 90-day product support. And since AutoCAD LT reads and writes data just like AutoCAD software, your work will be compatible with over a million AutoCAD users worldwide. Chances are your clients and colleagues are among them. So beware of cheap imitations. Visit your

And one inexpensive one.

Authorized

AutoCAD Dealer or leading retail software store. Or, for a free demo disk, call 1-800-228-3601 and ask us for Demopack A215. Outside the U.S. and Canada, fax 415-491-8311.



 Autodesk.

Read Only

REVIEWS OF THE LATEST BOOKS FOR THE PC USER

Edited by Tin Albano

How Steve Jobs Failed at His NeXT Attempt

BY DON WILLMOTT

Randall E. Stross has taken a long, hard look at how Steve Jobs tried—and failed—to build a second empire with NeXT Computer after being dethroned at Apple, and the conclusion he draws in *Steve Jobs and the NeXT Big Thing* is simple: Jobs's vaulting ambition and stunning egomania doomed him from day one.

As Jobs pursued his NeXT goal of creating a \$3,000 computer that would land on the desk of every college student, he ignored everything that the computer marketplace and his own experts were saying: "Keep in touch with the intended customers and avoid the pitfall of anaerobic isolation; do not assume that customers will pay any price to secure the latest computer technology; ease the way for customers to adopt a new standard by providing software and hardware bridges that help connect older machines to the new ones." According to Stross, Steve Jobs would disregard every one of these lessons when he launched NeXT.

What Stross finds amazing is that so many people—journalists, industry analysts, even wily

investor Ross Perot—were so easily captivated by Jobs's unparalleled charisma and seduced into believing everything he said about his company's finances and his expectations for a next-generation system.

In mid-1989, after long delays that Jobs was never blamed for, NeXT finally intro-

duced a \$7,000 monochrome system—with no floppy disk, virtually no useful applications software, and a slow, unproven magneto-optical disk.

Stross chronicles how Jobs tried to get corporate America to embrace the NeXT machine after the academic world rejected it, and how he was thwarted by competition from Sun and other companies that he had foolishly dismissed in an incredible display of the "reality distortion" for which he is justifiably famous.



In the end, only about 50,000 NeXT machines were ever built, and in February 1993 Jobs announced that NeXT would stop producing hardware and focus all its energy on the NeXTStep operating system—which has, in fact, shown promise on a wide variety of platforms.

The lesson here, well taught in Stross's detailed account, is as old as the hills that surround Jobs's beloved Silicon Valley: Pride goeth before a fall.

• **Steve Jobs and the NeXT Big Thing**, by Randall E. Stross, \$24.00. Atheneum, 212-702-2000. ISBN: 0-689-12135-0.

Circle 442 on reader service card

Remembering the Early Days at WordPerfect

BY LANCE ULANOFF

A "parting shot" is aptly named because it usually involves some pain for the recipient. But W.E. Pete Peterson's own shot, *AlmostPerfect: How a Bunch of Regular Guys Built WordPerfect Corporation*, lacks the venom most of his former coworkers probably expected. Sadness? Yes, but little anger. The strongest impression the reader walks away with is that Peterson has written a 208-page résumé.

AlmostPerfect does, however, crack the nut surrounding the software industry's most inter-

esting phenomenon: How does a software company manage to build in 10 years what a corporation in almost any other industry would take 50 years to achieve? Peterson's answer: Timing, low manufacturing costs, fly-by-the-seat-of-your-pants sales and marketing, and a belief in the product.

Peterson's 1992 departure (or ouster, depending on your perspective) from WordPerfect Corp., after nearly 12 years as executive vice president and part owner, marked a turning point both for him and for the company. Peterson, who by his own admission had little corporate experience (he had been a partner in a drapery business), had come to the conclusion over the years that WordPerfect Corp. may very well be a one-trick pony. As is well known, however, that trick—its word processing pro-

gram—is both popular and extremely lucrative.

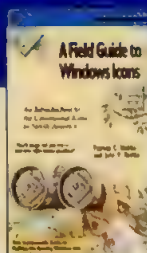
Now that Peterson has left the company and taken his paternalistic corporate philosophy out the door with him, WordPerfect has undertaken drastic cost-cutting measures (including layoffs) and reportedly plans dozens of new product releases this year.

Although it makes for an interesting read, *AlmostPerfect* never really takes flight. The perfunctory physical descriptions of major players like Alan Ashton and Bruce Bastion don't make up for the dearth of atmosphere.

The book is like Utah's salt flats: wide, vast, interesting for what must have gone into creating it, but ultimately flat. Everything that happens in *AlmostPerfect* seems like old news, and you never feel as if you are there.

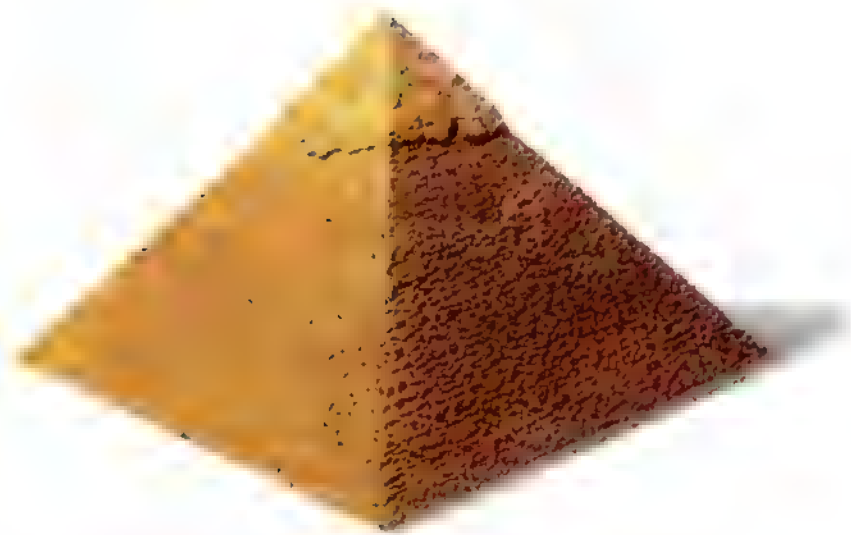
• **AlmostPerfect: How a Bunch of Regular Guys Built WordPerfect Corporation**, by W.E. Pete Peterson, \$18.95. Prima Publishing, 916-786-0426. ISBN: 1-55958-477-7.

Circle 443 on reader service card



Read Only Recommends

A must for all icon watchers. *A Field Guide to Windows Icons* names, categorizes, and classifies every known icon species with helpful, at-a-glance descriptions and scientific names (in Latin, of course). \$7.95, Osborne McGraw-Hill, 800-722-4726. ISBN: 0-07-881978-4.



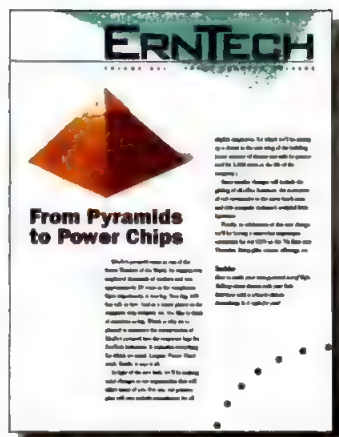
20 years.

100,000 men.

752 casualties.

Introducing the new
HP ScanJet IIcx. Scans
done easily for just
\$1,179.

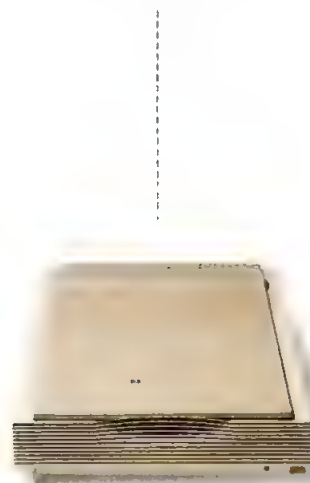
It's that simple. A click, a pass, an image—ready to be saved or incorporated into any document. With the added efficiency of HP DeskScan software, the HP ScanJet IIcx captures images in seconds. And with a TWAIN interface, you'll never have to leave your document to get them.



One click.

One pass.

One scanner.



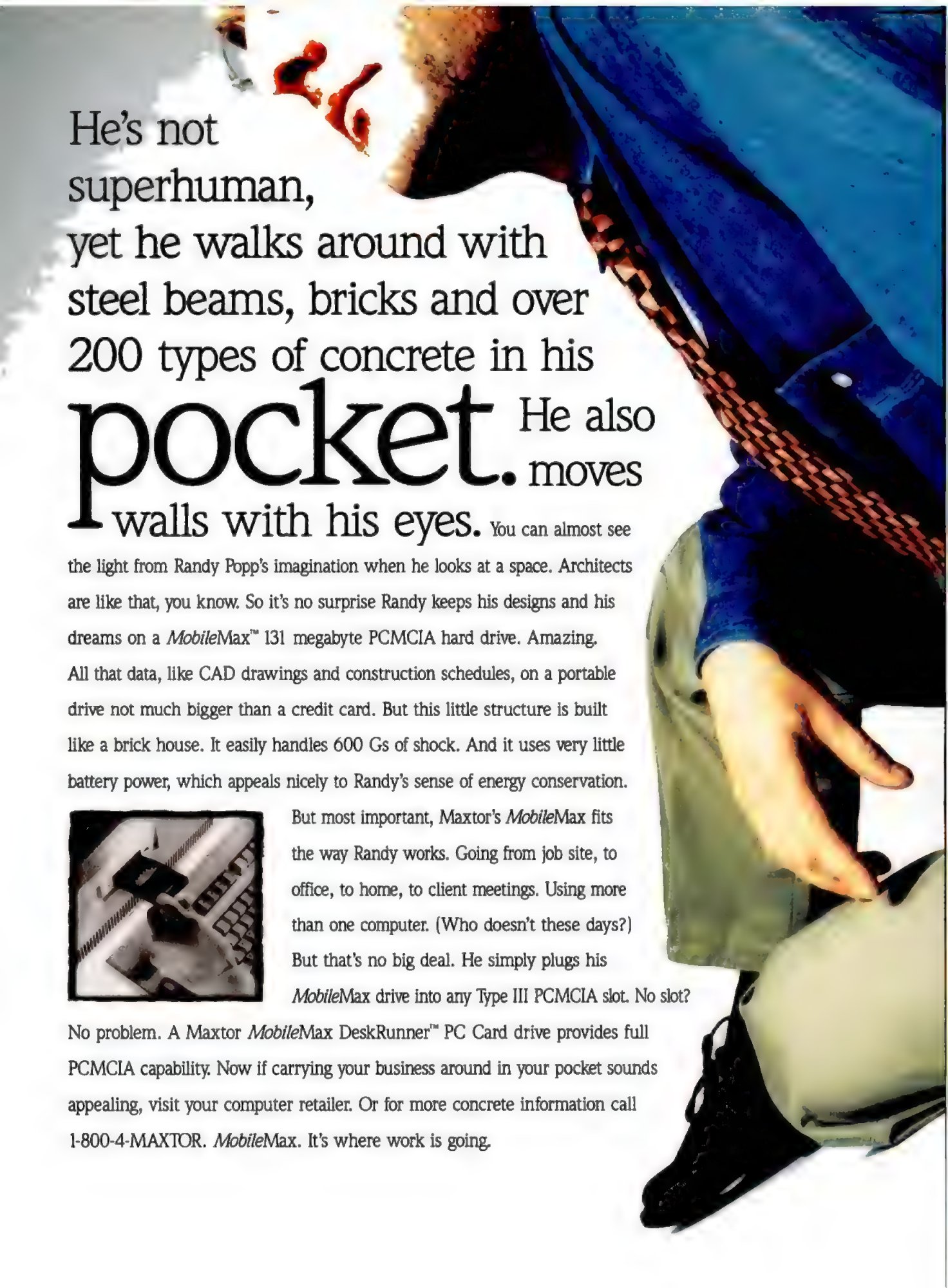
But simplicity is just part of the story. The HP ScanJet IIcx provides 256 levels of gray, 24-bit color, and 1600-dpi enhanced resolution (400-dpi optical) for scans that are always detailed, always accurate. HP's AccuPage 2.0 technology aids third-party OCR software in recog-

nizing hard-to-read text, thereby speeding up text scans. And Aldus™ PhotoStyler™ SE software allows you to edit scanned images without the need for additional software. Available as options are an automatic document feeder and our new transparency adapter.

With all this, it's easy to see why we're the number one PC scanner. So call now at 1-800-SCANJET, Ext. 7802* for more information or for the name of your local authorized HP dealer.



Suggested U.S. list price. In Canada call 1-800-387-3867, Ext. 7802. Aldus is a trademark of Aldus Corporation in the U.S. and other countries. PhotoStyler is a trademark of U-Lead Systems, Inc. in the U.S. and other countries and is licensed to Aldus Corporation. Pyramid data is estimated. ©1990 Hewlett-Packard Co.



He's not
superhuman,
yet he walks around with
steel beams, bricks and over
200 types of concrete in his
pocket. He also
moves
walls with his eyes.

You can almost see the light from Randy Popp's imagination when he looks at a space. Architects are like that, you know. So it's no surprise Randy keeps his designs and his dreams on a *MobileMax*™ 131 megabyte PCMCIA hard drive. Amazing. All that data, like CAD drawings and construction schedules, on a portable drive not much bigger than a credit card. But this little structure is built like a brick house. It easily handles 600 Gs of shock. And it uses very little battery power, which appeals nicely to Randy's sense of energy conservation.



But most important, Maxtor's *MobileMax* fits the way Randy works. Going from job site, to office, to home, to client meetings. Using more than one computer. (Who doesn't these days?) But that's no big deal. He simply plugs his *MobileMax* drive into any Type III PCMCIA slot. No slot?

No problem. A Maxtor *MobileMax* DeskRunner™ PC Card drive provides full PCMCIA capability. Now if carrying your business around in your pocket sounds appealing, visit your computer retailer. Or for more concrete information call 1-800-4-MAXTOR. *MobileMax*. It's where work is going.



MobileMax™
Maxtor®

©1994, Maxtor Corporation, San Jose CA. MobileMax and DeskRunner are trademarks of Maxtor Corporation.

CIRCLE 386 ON READER SERVICE CARD

"What to do when Windows™ won't work."

INCREASE SPEED

WINProbe uncovers the secrets to faster Windows operation. Simply click your mouse on "Tune Up" and **WINProbe** analyzes your system, then gives you up to 35 suggestions on how to speed up your system...

- Analyzes SmartDrive settings to improve hard drive performance
- Identifies and explains how to set up a permanent swap file
- Identifies which mode is best, Standard or Enhanced
- Pinpoints the optimum driver for your VGA card
- Optimizes and frees fragmented memory
- Analyzes and suggests the best Windows setup for your system

TROUBLESHOOT YOUR OWN PC

Few things are more aggravating than computer downtime and lockups. You waste time waiting for help and usually pay a dear price to get it when you finally do. Your time is valuable, so let **WINProbe** troubleshoot the problem for you. You'll be able to quickly identify the source of the problem; hardware, software, or configuration. Telephone support time is slashed. Repair bills drop like a rock (50% and more of your repair bills are for diagnosing the problem, **WINProbe** does it for you at NO COST!). Tests include...

- CPU and system board in 16 and 32 bit operation
- Math coprocessor
- Memory; conventional, extended, expanded, and XMS
- COM ports and MODEM control lines
- Floppy drive speed and surface analysis
- Hard drive surface analysis
- Keyboard and scan codes
- Video adapter and screen
- Mouse initialization and interrupts
- Printer operation, output, and cable



**Windows
EXPERTS'
PICK**

"This \$99 toolkit deserves high praise for ease of use, completeness, and accuracy."

Windows Sources

"A bargain worth writing home about."

PC Computing

"WINProbe's most impressive offering is its memory-reclamation capability. This feature alone is worth the price of admission."

PC Computing

RESOLVE SETUP PROBLEMS

Say 'goodbye' to software and hardware configuration and setup problems. **WINProbe** provides helpful information on...

- Installing a new hard drive
- CMOS display and edit
- IRQ, DMA, and UMB usage
- What to do when installing an add-in card
- Cleaning up *.INI and *.GRP files
- Memory allocation and management
- Locating and removing duplicated system files

OPTIMIZE MEMORY

WINProbe includes a memory optimization feature which lets you reclaim memory that Windows applications use but don't properly make available when you're in another program. Now you can avoid system crashes and other problems caused by reduced available memory.

COMPATIBILITY

WINProbe requires an IBM AT, 386, 486, PS/2 or compatible with at least 1MB of RAM, DOS 3.1 or higher, Windows 3.0 or higher, and either a Hercules mono, EGA, VGA, or SVGA video. A mouse is recommended but not required.

BUY WINPROBE OR BUY THE BUNDLE

WINProbe is available by itself or in a special bundle with **PC Certify**, Landmark's DOS troubleshooting software and **Landmark DOS for Windows**, the remarkable DOS-like operating shell for Windows.

2 GREAT DEALS! YOUR CHOICE:

WINPROBE...

ONLY \$49

WINPROBE BUNDLE...

**WINProbe • PC Certify
Landmark DOS for Windows
ALL 3 PROGRAMS**

ONLY \$99



**90 Day
Money-back
Guarantee!**

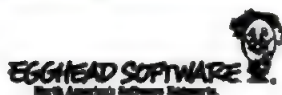
TO ORDER, OR FOR THE DEALER NEAREST YOU, CALL

(800) 683-6696

FAX: (813) 443-6603 • Int'l (813) 443-1331
Mon-Thur: 8AM-9PM, Fri: 8AM-6PM, Sat: 10AM-3PM

LANDMARK
RESEARCH INTERNATIONAL CORPORATION
703 Grand Central Street • Clearwater, FL 34616

Copyright © 1994 Landmark Research International Corp. All Rights Reserved. WINProbe and PC Certify are trademarks of Landmark Research International Corporation. Windows is a trademark of Microsoft Corporation. Other names are trademarks of their associated owners.



CIRCLE 169 ON READER SERVICE CARD



Michael J. Miller

The 486: A Final Requiem

No chip lives forever. In any arena where speed and power measure success, the fastest and the strongest are forever challenged and are eventually replaced. Nowhere does this hold truer than in the PC industry. We are constantly being introduced to newer

and faster chips that push the performance envelope while setting new standards for others to shoot for. Older chips simply fade away. Like the 8088, 286, and 386 before it, the 486 has begun its inevitable decline. It was bound to happen.

Now before you start writing letters telling me how you just bought a 486 system or reminding me that we just reviewed 486s in our last issue, let me explain what I mean.

THE NEW LOW END

Clearly, there are a lot of people with 486-based systems, and these machines are not obsolete as long as they run the software you want them to run. And the 486 architecture certainly continues to survive in new chips from Intel and its competitors such as AMD, Cyrix, and Texas Instruments.

What is dead is the original concept and design of the 486, as implemented in today's desktop computers. The original 486 processor ran at 25 MHz, both inside and outside the chip. Later versions pushed the 486's clock speed up to 33 MHz, and Intel simply removed the floating-point processor in the 486's SX variations. These are the kinds of chips that have simply been squeezed out of the desktop PC race.

In the mainstream market, and increasingly in the low-end market, 486 chips that run at the same speed internally and externally are no longer being seen. We're instead seeing new chip multipliers—where a chip runs at a faster speed internally than it does when communicating with a PC's bus. Intel was first in the x86 market with the popular chip doubler, the 486DX2. Now doubling—and even tripling—internal clock speeds is becoming common. In fact, the

DX2/66 is well on its way to becoming the new entry-level chip of choice.

The thought is breathtaking! A year ago, the DX2/66 was the fastest chip that most of us could get our hands on. Now I expect to soon see DX2 machines, with decent amounts of memory and hard disk storage, available for \$1,500 or less—and that would include an SVGA monitor. This will bring an amazing amount of power to just about everyone, and it points out just how quickly the market moves.

Many business users will think a DX2 isn't good enough and will instead opt for even faster chips, like Intel's DX4. This chip builds on 486 architecture by adding more cache and tripling the processor's clock speed. In what looks to be its most popular desktop configuration, the chip will run internally at 100 MHz on a standard 33-MHz bus. At \$2,000 to \$2,500, this is the new mainstream computer platform, and I expect huge numbers of these machines to sell over the next six months.

DX4 AND PENTIUM TAKE OVER

At the high end of the processing spectrum, there's a whole new generation of chips. Last year, machines based on Intel's Pentium processor sold only to a power-hungry few. This year, it looks likely that millions of 90-MHz Pentium machines will be sold. Because of the almost inevitable popularity of the 90-MHz Pentium, competitors such as AMD and Cyrix are quietly—or not so quietly—showing other processors that they claim will provide comparable performance.

Intel has also introduced 100-MHz Pentium processors, and it has publicly demonstrated 150-MHz versions, although I don't expect to see either



*The future is upon us.
Don't look back, and hurry along
as fast as you can.*

Michael J. Miller

kind of chip distributed in much volume this year.

What does all this mean? More power and increased performance. Just look at Winstone 94, our benchmark test based on 12 leading Windows applications. What we think of as a minimal machine, a typical 25-MHz 386, achieves an average score of 10. DX2/66-based machines are averaging close to 50. That's right: Today's "entry-level" machines are five times as fast as machines we were calling "high-performance" just three years ago.

The first group of DX4/100-based machines is coming in with Winstone scores around 65, a nice increment higher than the scores garnered by DX2/66 units. The first few 90-MHz Pentium machines are posting Winstone scores of 110 or higher. Now all of this isn't due to the processor; other factors—such as the amount and kind of memory, the speed of the hard disk, the kind of graphics board, and the bus type—also affect Winstone results. In any case, the fact remains

that we're seeing \$3,000 machines that run Windows 11 times as fast as the old 386s. That's a lot of power.

REBORN DESIRE

All of this will have a tremendous impact on our applications, and, as always, it will be new applications that will make people want new machines.

As their Winstone scores show, these new machines run traditional business applications much faster. But it's the new way these machines will be used that will really demand the increased processing power. To run lots of applications simultaneously in a multitasking operating system, and have those applications integrating together—with some of their objects doing "invisible" things in the background—we'll all want and need more power.

Just look at multimedia applications or any application that involves on-screen video. Sophisticated graphic design tools, 3-D modeling packages, and even multimedia help found in applications such as the CD version of 1-2-3 really look much better on faster machines. Even games such as LucasArts Entertainment's Rebel Assault and children's software like David-

son & Associates' Kid CAD seem slow on 486 machines. And video conferencing will take as much processing power as you can get your hands on.

The result will be exactly what we've seen happen before. Eventually, faster chips will become the whole market. A year from now, Pentium-class machines (based on fast chips from Intel and its competitors) are likely to represent the dominant force on the desktop. I even expect Pentium-class notebooks to dominate by the end of next year.

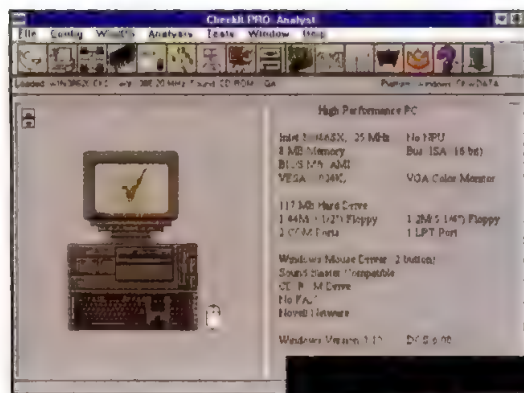
EULOGY FOR AN OLD FRIEND

Let's not pity the 486. Let's remember that it was on 486-based machines that graphical operating environments like Windows and OS/2 became dominant. It was the prevalence of 486-class machines that let designers include more advanced help features and better application integration. And finally, it was 486 desktops that really brought the first payoff to the promise of CD-ROM drives and multimedia applications.

486-based desktops have served us well. They've had a noble life. Still, we come not to praise the 486, but to bury it. □

Troubleshoot Problems By Yourself!

NEW



CHECK IT PRO
ANALYST



Check/It PRO: Analyst is designed for people who want answers, not just information. It saves time, eliminates unnecessary "house calls", and promotes problem-solving accuracy.

- New CKDATA program collects detailed hardware, software and performance data and stores it in a file for viewing by Check/It PRO: Analyst.
- Configuration data can be compared with previously collected files to find changes in hardware, software, or setup details.
- Manufacturers' requirements for add-on devices, expansion cards and software are evaluated to identify conflicts or to specify upgrades.
- A complete copy of each system's CMOS settings, AUTOEXEC.BAT, CONFIG.SYS, WIN.INI and SYSTEM.INI is automatically saved for examination, modification, or recovery.

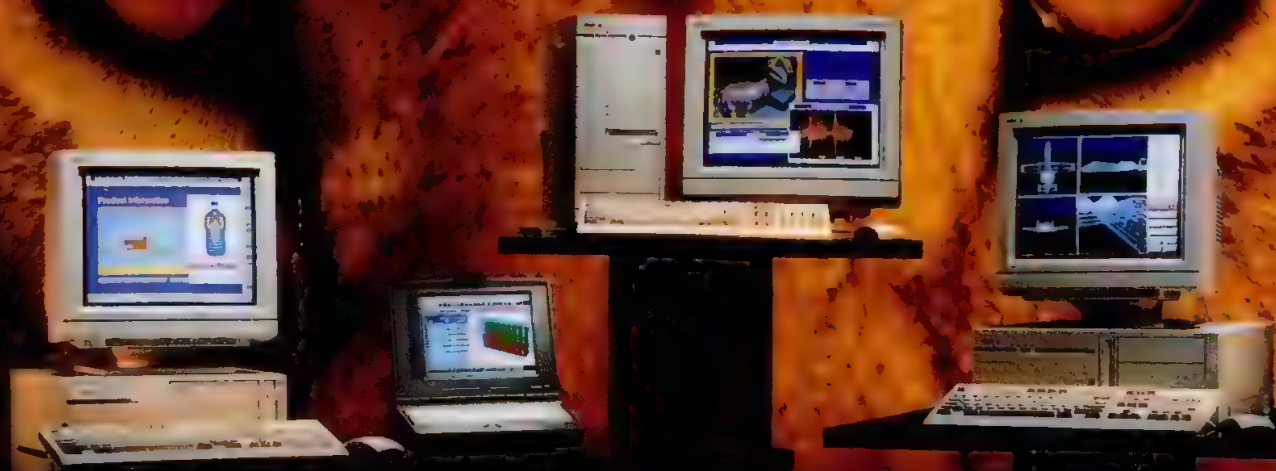
- Extensive system information and hardware diagnostic tests with detailed reports, are also included.

All these advanced capabilities are implemented in an easy-to-use Windows interface that includes a handy on-line Technical Reference Library. If you spend a significant amount of your time installing, upgrading, or trouble-shooting PC problems you need to check out this new program right away!

(800) 531-0450
or (714) 969-7746



TouchStone
Software Corporation
When in Doubt, Check It Out!



Meet Your Maker.

*The end-to-end direct source that
manufactures what it sells.*



Buy Direct From The Industry Source.

Come to the source for all your notebook needs.

ACER MANUFACTURES ITS OWN NOTEBOOKS.

At Acer, we know notebook computers inside and out—because we manufacture them ourselves. So when you're working on the road and need your network, mainframe or other resources that you use most, you can rely on your AcerNote for power and convenience. Stay connected with the PCMCIA capabilities featured in the AcerNote 750 and 735 series of modular color notebook computers. With PCMCIA, slide in a PC-card and you can tap into your network, send information to a fax machine via modem or access additional storage devices.

Service And Support

TALK TO A HELPFUL ENGINEER 7 DAYS A WEEK/24 HOURS A DAY.

Have a question about how to set up your system? Want to know how to get going on Microsoft Works for Windows? Curious about what options are available with your system? Just call us toll-free, any time of day, any day of the week and our trained professionals will be happy to help.

A FULL YEAR OF ON-SITE SERVICE.

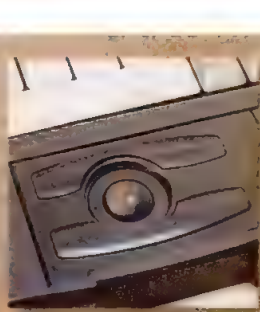
Don't worry. If you have a problem with your Acer desktop system, we'll have a skilled service representative out to you in 48 hours—we promise.

EXPRESS PARTS REPLACEMENT.

Because time is money, we will get replacement parts out in less than 72 hours.

30-DAY MONEY-BACK GUARANTEE.

We are so sure that you'll be totally satisfied with your new Acer system that we're offering a full 30-day money-back guarantee—no questions asked.



Ergonomic trackball and palmrest.



INCREDIBLE
IntelDX4-POWER

AcerNote 780cx IntelDX4™/75

INTRODUCING THE FLEXIBLE NEW INTEL DX4/75 ACERNOTE 780CX SERIES.

Now you can have outstanding IntelDX4/75MHz power and speed with the new AcerNote 780cx series. Incredible flexibility can be yours anywhere you need it with

PCMCIA ports

and a high-performance CPU packed into a sleek and sophisticated notebook computer with local bus video.



- IntelDX4/75MHz CPU
- 8MB System RAM
- 2 PCMCIA Type II Slots/1 Type III Slot
- 9.5" Active-matrix Color Display
- 340MB Hard Disk Drive
- Palmrest with Integrated Trackball
- Local Bus Video with 512KB Video RAM
- MS-DOS 6.2, Microsoft Windows 3.1
- International Travelers Warranty
- 24-hour "Hot Swap" Warranty



\$3,995

\$145 A Month Business Lease



Now you can buy Acer direct.



AcerNote 750c 486SL/25

- Intel 486SL/25MHz CPU
- 4MB System RAM
- 2 PCMCIA Type II Slots/1 Type III Slot
- 9.5" Active-matrix Color Display
- 209MB Hard Disk Drive
- Palmrest with Integrated Trackball
- MS-DOS 6, Microsoft Windows 3.1 and Works for Windows Installed
- International Travelers Warranty
- 24-hour "Hot Swap" Warranty

Active-Matrix Color Display ✓

\$3,395

\$123 A Month Business Lease



AcerNote 735c 486SX/33

- Intel SL-Enhanced 486SX/33MHz CPU
- 4MB System RAM
- 2 PCMCIA Type II Slots/1 Type III Slot
- 9.5" Passive-matrix Color Display
- 209MB Hard Disk Drive
- Palmrest with Integrated Trackball
- Local Bus Video with 512KB VRAM
- MS-DOS 6.2, Microsoft Windows 3.1
- International Travelers Warranty
- 24-hour "Hot Swap" Warranty
- Local Bus Video

Connect With PCMCIA ✓

\$2,395

\$87 A Month Business Lease



AcerNote 730c 486SX/25

- Intel SL-Enhanced 486SX/25MHz CPU
- 4MB System RAM
- 9.5" Dual-scan Passive-matrix Color Display
- 120MB Hard Disk Drive
- Palmrest with Integrated Trackball
- **Free Fax Modem and Software**
- MS-DOS 6, Microsoft Windows 3.1 and Works for Windows and Prodigy Installed
- International Travelers Warranty
- 24-hour "Hot Swap" Warranty

Affordable Color Notebook ✓

\$1,995

\$73 A Month Business Lease



AcerNote 730 486SX/25

- Intel SL-Enhanced 486SX/25MHz CPU
- 4MB System RAM
- 9.5" Monochrome Display
- 120MB Hard Disk Drive
- Palmrest with Integrated Trackball
- **Free Fax Modem and Software**
- MS-DOS 6, Microsoft Windows 3.1 and Works for Windows and Prodigy Installed
- International Travelers Warranty
- 24-hour "Hot Swap" Warranty

Exceptional Value And Performance ✓

\$1,395

\$51 A Month Business Lease

ASSISTANCE AROUND THE GLOBE.

When you take your Acer notebook on the road, you take first-class service and support with you. The AcerNote series is backed by a one year, 24-hour replacement warranty in the U.S. and Canada. To assure you the security of support in over 20 countries worldwide, a free one-year Acer International Travelers Warranty is also included.



Call 800-848-ACER

Monday through Friday 6 AM-6 PM and Saturday 8 AM-4 PM Pacific Time

When calling, please reference #054 ACD

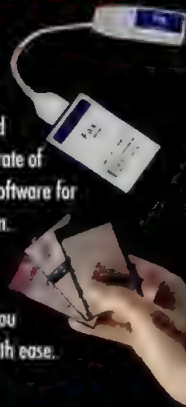


ACER NOTEBOOK ACCESSORIES

When it comes to notebook computers—Acer wrote the book! You'll find a full range of notebook computers offered in the AcerNote lineup, so you can be certain of finding just the right one for you. Plus, if you need any other peripherals or notebook accessories, count on Acer for the best in quality and performance.

PCMCIA FAX/DATA MODEMS AND LAN CARDS

Your office at your fingertips! A removable PCMCIA card allows you to send and receive faxes and data at a rate of up to 14.4 baud, with fax software for simple, error-free operation. LAN cards, with your option of either twisted pair or coaxial cable, get you into your office network with ease.



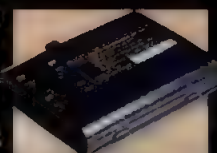
SPARE BATTERY

NiMH Battery Pack

AcerNote 750—\$199

AcerNote 735—\$169

AcerNote 730—\$169



NiCad Battery Pack

AcerNote 750—\$119

AcerNote 735—\$99

AcerNote 730—\$99

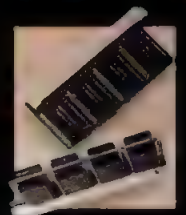
ADDITIONAL MEMORY

AcerNote 750, 735

or 730 Series—4MB

Memory Upgrade

\$269



AcerNote 735 or 730

Series—8MB Memory Upgrade

\$699

AcerNote 750 Series—16MB Memory Upgrade

\$1,599

Please call 1-800-848-ACER for details on the money-back guarantee, limited warranty and International Travelers Warranty. Return shipping and insurance charges are the responsibility of the customer. Not available in Canada. On-site service may not be available in certain remote locations. Products, availability, prices and programs are subject to change or cancellation without notice. Shipping and handling charges are extra. Acer, AcerNote and the Acer logo are registered trademarks and AcerNote, AcerPower, AcerView, AcerUp and AcerCase are trademarks of Acer America Corporation and Acer, Inc. Intel and the Intel Inside Logo are registered trademarks of Intel Corporation. IntelDX475 is a trademark of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. ©1994 Acer America Corporation. All rights reserved.

Acer

Acer raises the standard! All systems feature a CD-ROM.

YOU NEED A CD-ROM DRIVE TO MOVE FORWARD WITH TODAY'S TECHNOLOGY.

Technology waits for no one—so don't wait for other companies to realize a CD-ROM drive is an essential part of a complete PC system. New encyclopedias of information, interactive multimedia software and virtual worlds of advanced information technology are already becoming mainstream. Now Acer makes sure you won't be left behind by making CD-ROM drives a standard feature on all desktop PCs. **And to top it off, all systems also come standard with MS-DOS 6.2 and Windows for Workgroups.**

ACERPOWER—FOR POWER-HUNGRY APPLICATIONS.

Ready for a Windows workstation that's fast enough to keep up with you—and multiple applications? Then the AcerPower series is made for you. Real power-users wouldn't settle for less than the screaming 32-bit processing power, integrated CD-ROM drive and VESA local bus accelerated graphics featured in the AcerPower line. And don't worry about the system



taking up the whole room—the AcerPower series includes a slim minitower that's still big on power.

ACERACROS—THE AFFORDABLE HIGH-PERFORMANCE WORKSTATION.

If you thought 486 power, 32-bit processing, a built-in CD-ROM drive and accelerated local bus video were way out of reach of your budget—think again! The AcerAcros series has got it all at a price you can afford now. Add to your savings when you choose one of the EPA Energy Star-compliant AcerAcros systems. Some models enter a low-power-use state to conserve energy and costs. Plus, Acer ChipUp™ technology makes upgrading these systems as easy as replacing the single CPU chip.

RELY ON THE STRENGTH OF A \$1.9 BILLION GIANT.

Since our start in 1976, Acer has grown to be the vendor of choice for the world's top computer companies.

Some of the biggest names in the industry recognize Acer as one of the most quality-conscious PC manufacturers in the world today. Our attention to detail, excellent

record of reliability and great value have helped us to achieve status as the world's leading OEM manufacturer.

Acer has achieved a solid reputation for innovation after 17 years of building unique computing solutions. You'll get new technology first with Acer. And now you can buy direct from the industry source.

\$1.9
BILLION



\$2,995

*\$108 a Month
Business Lease*

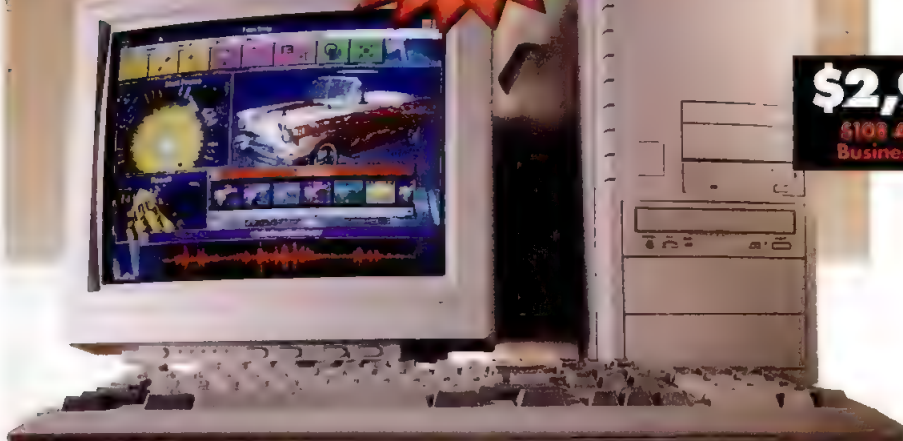


JOIN THE PENTIUM™ REVOLUTION WITH THE ACERPOWER 9000T.

Make the next technological move up with the impressive Pentium-based AcerPower 9000T. Unmatched 64-bit processing speed and massive expansion capability add up to a system that will serve you for years to come—at a price you can afford now.

Acer Power 9000T

- Intel® Pentium 60MHz CPU
- 8MB System RAM (expandable to 192MB)
- 256KB Second-level Cache
- 540MB Fast IDE Hard Drive
- Panasonic® 2X CD-ROM Drive
- 1.44MB Floppy Disk Drive
- 15" .28mm Dot Pitch Non-interlaced SVGA Color Monitor
- ATI PCI Graphics Accelerator
- 2 PCI 64-bit Expansion Slots
- 4 ISA 16-bit Expansion Slots
- 1 Combination PCI/ISA Slot
- Microsoft® Windows™ for Workgroups, MS-DOS® 6.2, Productivity/Entertainment Packs, Works for Windows™ and Quicken® Installed



Now you
800-848-ACER



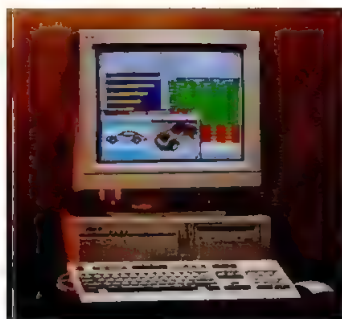
AcerPower 486DX2/66T

- Intel 486DX2/66MHz CPU
- 16MB System RAM (expandable to 64MB)
- 256KB Second-level Cache
- 420MB Hard Disk Drive and 2X CD-ROM Drive
- 1.44MB Floppy Disk Drive
- S3 1MB VESA Graphics Accelerator
- 15" .28 Non-interlaced SVGA Color Monitor
- Upgradable to Intel Pentium Upgrade Processor
- Microsoft Works for Windows, Productivity/Entertainment Packs and Quicken® Installed
- 8 16-bit ISA Slots, 2 on 32-bit VESA Bus

The Power House

\$2,755

\$99 A Month Business Lease



AcerPower 486DX2/66

- Intel 486DX2/66MHz CPU
- 8MB System RAM (expandable to 64MB)
- 256KB Second-level Cache
- 340MB Hard Disk Drive and 2X CD-ROM Drive
- 1.44MB Floppy Disk Drive
- S3 1MB VESA Graphics Accelerator
- 15" .28 Non-interlaced SVGA Color Monitor
- Upgradable to Intel Pentium Upgrade Processor
- Microsoft Works for Windows, Productivity/Entertainment Packs and Quicken Installed
- 8 16-bit ISA Slots, 2 on 32-bit VESA Bus



\$2,355

\$85 A Month Business Lease



AcerPower 486DX2/50

- Intel 486DX2/50MHz CPU
- 8MB System RAM (expandable to 64MB)
- 128KB Second-level Cache
- 420MB Hard Disk Drive and 2X CD-ROM Drive
- 1.44MB Floppy Disk Drive
- S3 1MB VESA Graphics Accelerator
- 15" .28 Non-interlaced SVGA Color Monitor
- Upgradable to Intel Pentium Upgrade Processor
- Microsoft Works for Windows, Productivity/Entertainment Packs and Quicken Installed
- 8 16-bit ISA Slots, 2 on 32-bit VESA Bus

The Graphics Blaster

\$2,195

\$79 A Month Business Lease



AcerAcros 486DX2/50

- Intel 486DX2/50MHz CPU
- 4MB System RAM (expandable to 36MB)
- 128KB Second-level Cache
- 420MB Hard Disk Drive and 2X CD-ROM Drive
- 1.44MB Floppy Disk Drive
- 1MB VESA Cirrus Logic™ Graphics Accelerator
- 14" .28 Non-interlaced SVGA Color Monitor
- Upgradable to Intel Pentium Upgrade Processor
- Microsoft Works for Windows, Productivity/Entertainment Packs and Quicken Installed
- 4 16-bit ISA Slots

The Perfect Windows Workstation

\$1,795

\$65 A Month Business Lease



AcerAcros 486SX/33

- Intel 486SX/33MHz CPU
- 4MB System RAM (expandable to 36MB)
- 340MB Hard Disk Drive and 2X CD-ROM Drive
- 1.44MB Floppy Disk Drive
- 1MB VESA Cirrus Logic Graphics Accelerator
- 14" .28 Non-interlaced SVGA Color Monitor
- Upgradable to Intel Pentium Upgrade Processor
- Microsoft Works for Windows, Productivity/Entertainment Packs, Quicken and Prodigy® Installed
- 4 16-bit ISA Slots
- 128KB Cache Upgrade.....\$35

Excellent Price/Performance

\$1,495

\$54 A Month Business Lease



UPGRADE YOUR MONITOR

For just a little extra money you can see a lot more. Take advantage of our monitor upgrade program.

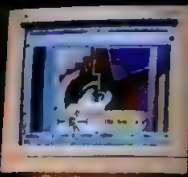


\$99
Additional

ACERVIEW™ 56L 15" COLOR MONITOR

- 15" Non-glare Flat Square Screen
- Low Radiation CRT
- Superfine 0.28mm Dot Pitch
- 1024 x 768 Resolution, NI
- Intelligent Micro-control System
- Ergonomic Tilt/Swivel Base

\$549
Additional



ACERVIEW 761 17" COLOR MONITOR

- 17" Non-glare Flat Screen
- Superfine 0.28mm Dot Pitch
- iColor System for Color Adjustments
- Intelligent iScreen Menus
- Automatic Display Mode Switching
- 16 User-programmable Display Modes
- VGA, SVGA, XGA, VESA and CAD/CAM Compatible
- VLMF Low Radiation Feature

Call for prices to purchase monitors separately.

MULTIMEDIA UPGRADE KIT



Make the most of the new Acer CD-ROM standard with this special multimedia

upgrade kit that includes: Sound Blaster and Business Audio-compatible 16-bit Sound Card; High-performance Stereo Speakers; Microsoft Multimedia Bundle with Works, Encarta™, Golf, Cnema™ and Soundblasts™

only **\$195**

can buy Acer direct.

Monday through Friday 6 AM-6 PM and Saturday 8 AM-4 PM Pacific Time

* When calling, please reference #054 ACD

CIRCLE 034 ON READER SERVICE CARD

Acer

There are people who have a need for speed. And people who are going places. Many times it's even the same person. That's why we created Reno.[™]

Not only is it the fastest double-speed CD-ROM drive around, with an ultra-quick access time of 180ms—it's also so portable it can be taken anywhere.

Take it to work, bring it home, or slip it in your briefcase and take it on the road. Reno is compatible with most notebook computers and comes equipped with an AC power adapter, rechargeable batteries,

stereo headphones, a protective carrying case and a standard SCSI 2 interface.

So if you've got the drive for power, we've got the drive for you. It's compact, sleek, light and easy to install. It's also compatible with both PCs and Macs and available as part of a complete multimedia kit. For more information or a dealer near you call **1-800-845-5870**. Reno from Media Vision. It'll take you where you want to

go—and go wherever you want to take it.

AT LAST, A CD-ROM DRIVE WITH REAL GET-UP-AND-GO.



With Reno's power you can play CD-ROM games and create multimedia presentations



Reno doubles as a great portable CD-audio player.



MEDIA VISION
Now, that's multimedia!

© 1994 Media Vision, Inc. 4300 Bayside Parkway, Fremont, CA 94538. (800) 845-5870. Reno is a trademark of Media Vision, Inc.
All other trademarks and registered trademarks are the property of their respective holders.

CIRCLE 093 ON READER SERVICE CARD



Bill Machrone

Pigs, Ducks, and RSI

Repetitive strain injury (RSI) is a fact of life. Postal workers, assembly-line workers, and keyboard users are all subject to it. The best known repetitive strain injury is carpal tunnel syndrome, but many others are possible as well. My wife suffered

a strain injury in her elbow and found shifting gears so painful that we sold her car and got one with an automatic transmission.

Compaq recently won a jury verdict in a liability case over RSIs. The suit said that Compaq should have known that its products caused injuries and therefore should have warned people who bought them. The jury found that since Compaq didn't know its PCs could be harmful, it was not liable.

This case is only the tip of the iceberg. It's the first in a long and potentially grueling series of cases that will take years to resolve. This first decision says, in effect, that ignorance is bliss. It's a terrible precedent but typical of our legal system. Next, plaintiffs will try to establish when exactly the manufacturers "knew" that people could suffer strain injuries from keyboards. Compaq's attorney, of course, maintained that there is no evidence that keyboards cause strain injuries.

Both sides are oversimplifying the issues at this stage of the game. RSI is more than a physical injury; it's an attitude thing. If you enjoy what you're doing, you generally don't get hurt. If you hate what you're doing, your body is wide open for injury.

THE CHINESE CONNECTION

Consider doctors and nurses who cruise through cold and flu season with nary a sniffle. They're so committed to the healing process that it extends to themselves. For that matter, did you ever wonder why there is such a thing as a flu season and why many of the influenzas have names associated with Asia? It all comes down to pig farmers in China.

Pigs love their mud wallows, and the custom in China is for pigs to share these muddy ponds with ducks. Pigs and people are

subject to many of the same diseases, including swine flu. Migrating ducks bring avian virus strains to the ponds. Avian viruses do not typically affect humans or pigs, but in the primordial soup of the duck/pig pond, avian and porcine viruses mix by means best left unexplained here. The pond is a fertile breeding ground for new viruses for which we have no immunity.

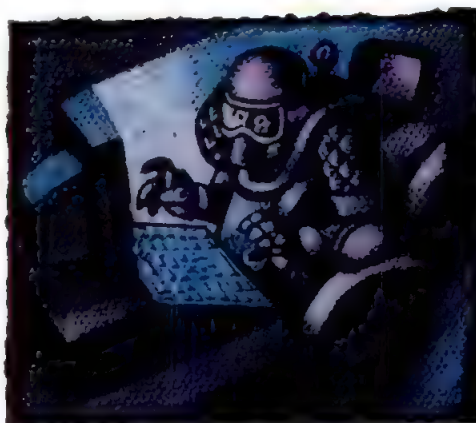
The point here is that we don't sue the pig farmers when we get the flu, just as I didn't sue the car manufacturer for my wife's pain and suffering and for not warning us that the standard transmission could cause injury.

Let's look again at attitudes and how they affect repetitive strain injury. I visited Australia a number of years ago and an epidemic of RSI was sweeping the country. It was a nationwide disease among keyboard users. Everywhere I went, RSI (and Aussie football) was about the only thing folks could talk about.

One day I was sitting in the editorial offices of a major Australian publisher, trying to connect to MCI Mail via Hawaii, when a young woman jumped up, obviously agitated, shaking her hands with a worried, panicked look on her face. I asked what the matter was, and

she said, "I felt some RSI creeping into my hands." The woman next to her ceased work to help massage her hands, much to the disappointment of the young man across the aisle who clearly wanted that privilege but was left wringing his own hands, wondering when the malady would strike him down.

I also believe that anyone who is mentally predisposed to RSI will suffer more than one who is not. Those hyperaware Australians were not necessarily more predisposed. If anything, their caution probably caused them to be

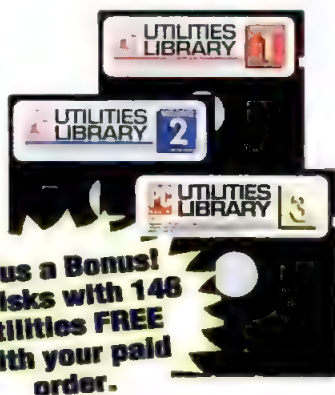
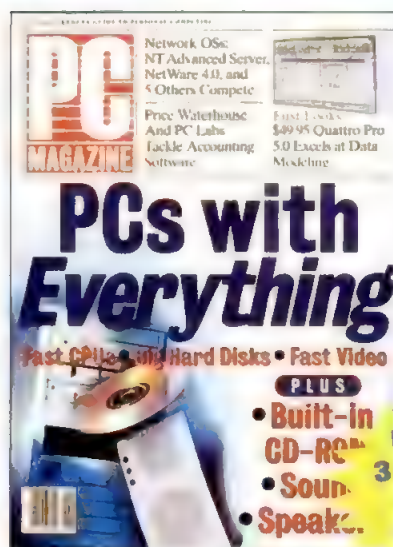


Are keyboards a real hazard to your health? Or are you your own worst enemy?

INSIDER'S PRICE

FOR OUR READERS — SUBSCRIBE & SAVE

ANNUAL COVER PRICE	REGULAR SUBSCRIPTION PRICE	YOUR PROFESSIONAL RATE	BONUS STATUS
\$64.90	\$44.97	\$29.97	3 FREE DISKS



Subscribe now, and get 22 issues for only \$29.97 — that's 54% off the annual cover price! Better yet, sign up for two years and get 44 issues for just \$49.97 — a savings of 62%!

Along with your order you'll also get PC Magazine's "Utilities Library" on 3 disks — **FREE** with your paid subscription! These 146 DOS and Windows™ utilities, selected especially for new subscribers by PC Magazine's editors, let you upgrade your system, boost your PC power, and simplify tasks — all at the touch of a key! This exclusive software is available only to new subscribers!

ONE YEAR

22 issues for \$29.97.
YOU SAVE 54%!

TWO YEARS

44 issues for \$49.97.
YOU SAVE 62%!

Call toll-free today:
1-800-289-0429

Canada and foreign add \$36.00 per year. U.S. funds only. Canadian GST included. Please allow 30 days for shipment of first issue. FREE disks will be sent upon payment.

Bill Machrone

more sensitive to work conditions, ergonomic considerations, and fatigue. Their paranoia was probably replaced in time by a more rational concern. Far more susceptible are the people who just hate their jobs and internalize it, who let the stresses and strains build up to the point where something has to give. Your body responds to stress with a variety of maladies that are quite real physically. For all practical matters, there is no separation between brain and body.

THE REAL CULPRIT

So we return to the question of who's to blame. Next time you get the flu, try suing those pig farmers. They're the manufacturers, right? Singers sometimes get nodules on their vocal cords. Should they sue the writers of the music or perhaps the grade-school teacher who encouraged them to sing? The real national disease in the United States is not RSI but the ongoing quest to blame your problems on other people and to use the body of law to make them pay through their noses for your misery, misfortune, or stupidity.

I foresee some unfortunate outcomes of all this litigation. The simplest will be to have ugly warnings pasted on your keyboard and monitor. They'll be about as effective as that big plastic tag on your hair dryer that tells you not to take a bath with it. Worse will be resident software that pops up to tell you that you've been typing too long. In a society in which the manufacturers have to warn people about potential hazards in order to head off lawsuits, we've become utterly inured to all the labels, stickers, and instruction sheets. A legal defense has become an aesthetic offense.

If you're concerned about the potential for repetitive strain injury in your workplace, you should be looking for opportunities to restructure jobs so that they don't require nonstop, head-down typing, just as many assembly lines have been restructured into teams and quality circles in which members perform a variety of tasks. The additional benefits in job satisfaction and lower turnover are obvious.

The voice typewriter is almost within reach today. In two to five years, typing will be history. I just hope that people don't start suing their employers because of sore throats. □

System-Saving Upgrades.

POWER SUPPLIES

"The premier power-supply maker"

John Dvorak, *PC Magazine*, March 30, 1993

"The only company to go to for a power supply"

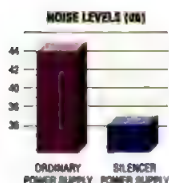
Jerry Pournelle, *Byte*, April 1993

ENERGY-SAVING UNITS

Save electricity with our economical Energy-Star power supplies. Fully-tested and UL/CSA/TUV approved, they're perfect for standard systems.

STAR 205 SLIM/DESK/TOWER \$79

ULTRA-QUIET UNITS



Unrattle your nerves with an ultra-quiet **Silencer** power supply. Appreciated by users since 1986, their high-efficiency fans and low-turbulence circuitry reduce noise by up to 84%!

A must for home office or *multimedia* applications.

SILENCER 205 SLIM \$109

SILENCER 220 DESK/TOWER \$119

SILENCER 270 DESK/TOWER \$179

HIGH-PERFORMANCE UNITS



Upgrade your computer with one of our premium **Turbo-Cool** power supplies—the choice of PC professionals. You'll get 50% - 100% more power, built-in line conditioning, super-tight regulation, ultra-clean output, a high-capacity cooling fan, UL/CSA/TUV, a 3-year warranty for 300W models, and a 5-year warranty for the 450! Ideal for high-end workstations and network file servers.

TURBO-COOL 300 SLIM/BABY \$169

TURBO-COOL 300 DESK/TOWER ... \$189

TURBO-COOL 450 DESK/TOWER ... \$349

SOLID-STEEL CASES



Give your computer a professional, high-tech look with one of our premium-quality, **USA-made**, all-steel cases. They're rigid—unlike light-weight imports—so the PC's components are always properly aligned and grounded.

You'll enjoy easy system access, and with room for up to 18 drives, there's real expandability!

	Desktop	Tower	Monster
Exposed Drive Bays:	5	6	13
Total Drive Bays:	7	8	18
Motherboard Capacity:	1	1	2
Power Supply Capacity:	1	1	2
Cooling Fan Capacity:	2	3	6
Filtered Air Inlet:	Yes	Yes	Yes
Lockable Front Door:	Yes	No	Yes
Beige or Black Finish:	Yes	Yes	Yes
Meets FCC-B Specs	Yes	Yes	Yes
Made in USA	Yes	Yes	Yes

SOLID-STEEL DESKTOP CASE \$175

SOLID-STEEL TOWER CASE \$295

SOLID-STEEL MONSTER CASE \$895

REDUNDANT POWER

Eliminate the risk of network downtime or data loss due to power supply failure with the **TwinPower 900** redundant power system. It delivers high-capacity, fault-tolerant power to your entire network server. Consists of two **Turbo-Cool 450** power supplies in parallel, utilizing a special power-management interface module. A must for *mission critical* LANs.

- 900 watts peak power
- 100X more reliable than a single-unit
- load-sharing design
- hot-swap capability
- 5-year warranty
- monster-case compatible



TWIN-POWER 900 \$995

OVER-TEMP ALARM

Don't wait for the acrid smell of burnt components! With our new **110 Alert**, you'll know if your PC is over-heating *before* damage occurs. Should the computer's temperature reach 110°F, a loud alarm warns you that a fan has failed or that the cooling system is inadequate to handle that extra hard drive or other peripheral you may have added. Compatible with any computer, the inexpensive **110 Alert** is compact, easy to install, and so reliable, it carries a lifetime warranty.



110 ALERT \$19

CPU COOLERS

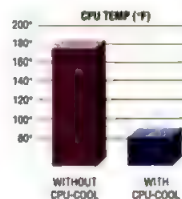


It's a fact. 486 chips run hot, often exceeding 185°F! Now, you can cool your 486 to a safe 85°-95°F with our popular **CPU-Cool**. It prevents random system errors and other heat-related problems. Consists of a mini-fan embedded in a die-cast heat sink that easily mounts on the CPU. Powered by a spare drive connector. Effective, inexpensive insurance!

- cools CPU 70° - 100°F
- prevents system errors
- adds years to CPU life
- thinner, quieter, and better-built than cheap imported imitations.
- safe, simple installation

CPU-COOL (FOR 486s) \$24

PENTACOOL (FOR PENTIUMs) \$29



PC POWER & COOLING, INC.

5995 Avenida Encinas, Carlsbad, CA 92008 • (619) 931-5700 • (800) 722-6555 • Fax (619) 931-6988

We accept Visa, MC, COD, or PO on approved credit. Warranty period: Five years for Twin Power and Turbo-Cool 450. Three years for Turbo-Cool (except 450). Two years for all others (except 110 Alert). Hours: 7 a.m. - 5 p.m. (PT) Mon. - Fri. Silencer, Turbo-Cool, TwinPower, CPU-Cool, PentaCool, and 110 Alert are trademarks or registered trademarks of PC Power & Cooling, Inc. ©1994 PC Power & Cooling, Inc.

CIRCLE 080 ON READER SERVICE CARD



EVEN THOUGH SOMETIMES IT SEEMS LIKE YOU'RE IN IT ALONE, YOU KNOW THAT YOU RELY ON THE PEOPLE AROUND YOU AND THAT ULTIMATELY NOTHING GETS DONE WITHOUT TEAMWORK. SO IT MAKES

SENSE THAT YOUR SOFTWARE SHOULD HELP THIS PROCESS, NOT STAND IN THE WAY.

THAT'S WHY LOTUS® SMARTSUITE® IS

DESIGNED FOR WORKGROUPS, NOT JUST

INDIVIDUALS. SMARTSUITE IS FIVE

WINDOWS™ APPLICATIONS — 1-2-3®

AMI PRO® WORD PROCESSOR, APPROACH®

5

applications
for about
the price
you'd pay for
2.

DATABASE, ORGANIZER™

PERSONAL INFORMATION

MANAGER AND FREELANCE

GRAPHICS® — FULLY INTE-

GRATED TO WORK TOGETHER.

AND ENABLED WITH POWER-

FUL WORKGROUP FEATURES

TO HELP CO-WORKERS DO THE SAME.

FOR STARTERS, EACH APPLICATION

SHARES A CONSISTENT LOOK AND FEEL.

EVERYTHING WORKS THE WAY YOU EXPECT

IT TO, SO IF YOU'VE LEARNED ONE

APPLICATION, YOU WON'T SPEND A LOT OF

TIME LEARNING THE OTHERS.

SMARTSUITE INCORPORATES MANY PRODUCTIVITY FEATURES YOU

JUST CAN'T GET ANYWHERE ELSE. LIKE COLLECT AND COPY WHICH

LETS YOU TAKE MULTIPLE DATA RANGES FROM ANY NUMBER OF

You know that to do great, important tasks, two things are needed - a plan and not quite enough time. Well, we've got this software that works to let you share all sorts of information and plans and goals and whatnot so it actually gives you more time. But just not too much of it.

\$299

NOTES VIEW

Product	Region	Sales
Phones	East	\$ 978,600
	West	\$ 263,200
Beepers	East	\$ 134,600
	West	\$ 223,200

SmartSuite knows how to talk to Notes. Notes/FX allows a field-level exchange between SmartSuite apps and Notes.

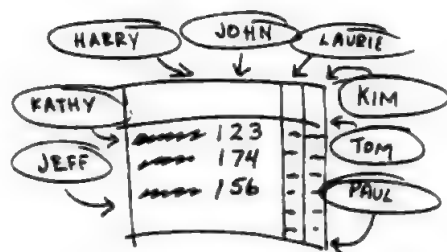
1-2-3	
Products	Beepers
Region	West
Sales	\$223,200

1-2-3 SPREADSHEETS AND BRING THEM INTO AN AMI PRO DOCUMENT WITH A SINGLE CLICK, SETTING UP A LIVE OLE LINK AT THE SAME TIME.

LOTUS SMARTSUITE MOVES BEYOND INTEGRATING APPLICATIONS TO INTEGRATING WORKGROUPS THROUGH BUILT-IN TECHNOLOGIES LIKE VERSION MANAGER™

WHICH LETS WORKGROUP MEMBERS WORK ON THE SAME FILE CONCURRENTLY, ADDING THEIR

INSIGHT WITH-
OUT CREATING
CONFUSION.



Version Manager technology lets many people work on the same document. Add Notes and they can do it at the same time.

AND TO REALLY EXPERIENCE THE POWER OF WORKING TOGETHER®, COMBINE SMARTSUITE

WITH NOTES®, THE GROUNDBREAKING

GROUPWARE FROM LOTUS. RIGHT NOW

ALMOST 750,000 PEOPLE IN MORE THAN

3,000 COMPANIES ARE USING NOTES

TO ACCESS, TRACK AND SHARE DATA

IN WAYS NEVER BEFORE POSSIBLE.

NOW YOU CAN HARNESS THE POWER

OF SMARTSUITE'S INDIVIDUAL APPLICA-

TIONS FROM WITHIN NOTES, USING 1-2-3'S

POWER TO CRUNCH NUMBERS, AMI PRO'S FACILITY

WITH WORDS OR FREELANCE GRAPHICS' PRESENTA-

TION CAPABILITIES—WITHOUT LEAVING THE NOTES

DOCUMENT. PLUS SMARTSUITE'S NOTES/FX™

FEATURE AUTOMATES

THE EXCHANGE OF INFORMATION BETWEEN THE DESKTOP APPS AND LOTUS

NOTES. THE BOTTOM LINE IS A BETTER LEVEL OF COMMUNICATION—MORE COMPLETE AND MORE ACCURATE THAN EVER BEFORE.

LOOK INTO SMARTSUITE. A SMARTSUITE UPGRADE COSTS \$299.* JUST CALL

1-800-TRADE-UP, EXT. 9578.** THE TIME YOU SAVE WILL BE YOUR OWN.

Lotus
Working Together®



April 12, 1994
ZEOS Panthera-66

*"An Excellent
Pentium PC"*

PC MAGAZINE EDITORS' CHOICE PANTERA SYSTEM

Pentium-60.....\$3295
Pentium-66\$3495
Pentium-90\$3695

- Intel 60, 66MHz or 90MHz Pentium CPU
- 16MB RAM, 256K SRAM cache
- 528MB local bus IDE hard drive, 256K cache
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond Viper/PCI local bus SVGA color graphics card with 2MB VRAM
- ZEOS 15" NI SVGA color monitor, .28mm dp
- 2 high-speed (550) serial ports, 1 enhanced parallel port
- 3 PCI slots, 5 ISA slots
- Integrated 12-bit ADPCM business audio
- On-board SCSI socket
- Flash BIOS
- 10-bay vertical case with two cooling fans
- 101-key space-saving keyboard
- MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse. Choice of Lotus application



Award-Winning ZEOS[®] Panthera...TM

Leave the tights and cape at home. You won't need them. The ZEOS Panthera is the fastest thing around!

So it's not capable of leaping tall buildings. But, *it will* give you amazing performance and super power at an affordable price. *PC Magazine* agrees. They gave the ZEOS Panthera the coveted Editors' Choice award in their

Pentium PC roundup (April 12, 1994). Why? Because the Pentium-processor based Panthera gives you everything. It "...combines quality features, good price, and high performance under both DOS and Windows (benchmark tests)."

Sticking to our credo of always providing the very best, you'll marvel at your new Panthera. *PC Magazine* reported: "A consistently above average performer on all our benchmark tests, the Panthera-66 should be more than powerful enough for most. The Panthera-66 goes beyond being merely a good piece of hardware."

Our award-winning performance is achieved through such features as a hot new PCI Local Bus IDE Controller (supporting up to four IDE devices) built into the motherboard. This "pushes

Faster Than A Speeding Bullet.

disk access into new territory."

There's more. We give you 3 PCI slots (one contains our incredible new PCI local bus video card) and 5 ISA slots. Also, ZEOS is one of the first to give you write-back cache standard for the fastest caching scheme available.

Plus, you can now choose the latest Intel Pentium processor running at 90MHz for the most demanding computing needs. We give you all this power at a marvelous price. As *PC Magazine* said, "solid performance and affordable price make the ZEOS Panthera-66 a quality investment."

Quality and reliability doesn't stop with the product. *PC Magazine* concurs: "As an added bonus...ZEOS placed in the highest category on our semiannual survey of service and reliability (January 11, 1994)..."

You don't have to be a super hero or "man of steel" to figure it out. The ZEOS Panthera is the essential element to your business—from crime fighting to CAD. It's an absolute must for all your high-tech mission-critical operations. And yes, it's even faster than a speeding bullet. Protect yourself, your business and your most important data. Call a ZEOS Systems Consultant now.



Fax Orders: 800-362-1205 or 612-362-1205. Phone orders: Government: 800-245-2449, Outside U.S. and Canada: 612-362-1212. Purchase Orders, MasterCard, VISA, Am Ex, Discover, Z-Card, COD and affordable leasing programs. Open 24 Hours a Day, 365 Days a Year!

Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 36-month lease, 10% purchase option. All prices, specifications and availability are subject to change without notice; call to confirm these and warranty details. Prices do not include shipping. All products and company names are trademarks or registered trademarks of their respective holders. Intel and Pentium are trademarks of Intel Corporation in the USA and other countries. ZEOS is a registered trademark, Z-Card and Computers Now! are registered servicemarks. Panthera is a trademark of ZEOS International Ltd. © 1994 ZEOS International Ltd., 1301 Industrial Blvd., Minneapolis, MN 55413 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS). PEN-PCM-9406A

CALL NOW TOLL FREE
800-554-7172





John C. Dvorak

PCMCIA Blues

If I were going to summarize this column in two words, it would be: PCMCIA stinks! I admit that I heartily promoted this technology in the early days, but that was then and this is now. It's not the technology that's at fault, but the implementation of the

technology. The maniacal desire to make PCMCIA an all-purpose bus is going nowhere fast.

PCMCIA means Personal Computer Memory Card International Association. It does not mean Personal Computer Modem Card International Association. Or SCSI Card International Association. Or Network Card International Association. Or any number of other dubious uses of "Card International Association."

I agree with nutty engineers who think it's neat that a V.32bis modem can fit into such a small card. All together now: "WOW!" Having said that, let's get real. It's the connection (actually the connector) to the outside world that is the problem.

I've been remiss about uncovering the flaws of PCMCIA. Six months ago, when I was in editor-in-chief Michael Miller's office and I jokingly shook an RJ-11 dongle that attached to a PCMCIA modem, I said to him, "Don't lose this or you'll be in big trouble!" I should have realized then that PCMCIA had become a farce. Then someone from Hayes showed me a PCMCIA modem with still another delicate dongle (a different kind) that carefully attached to the end of the PCMCIA modem card.

I've looked at all these itchy-bitsy oddball connectors that work with PCMCIA modems and listened to all the excuses for their design (including the nonsense about foreign connectors—most of which are illegal in foreign countries) and have concluded that we have to stop and rethink this whole mess. Delicate connectors do not go together with rugged mobile computing. It's an anathema. These PCMCIA modems are disasters waiting to happen.

My old TI-2000 has two built-in RJ-11s. One was even busted some years back, but I can still make a connection with it. My IBM Thinkpad 700 had a built-in

modem, and the connector is still screwed solidly in place. My new Thinkpad 750 uses a PCMCIA modem that needs a dongle. You forget the dongle and you're out of luck. You mash the dongle and you're out of luck. You nick one of the little dongle hold-downs and you're out of luck. A piece of sand gets into the dongle and you're out of luck. One time, I was pulling the dongle out of the ThinkPad's PCMCIA modem, and the entire PCMCIA card popped out of the system. (I have a witness.) Sheesh. And now, sound cards and SCSI cards and network cards are using a dongle. Good luck!

The best solution is the original solution: a built-in modem with a port on the side of the machine screwed securely into the machine. When the modem was dedicated to the computer, there was no need for convoluted PCMCIA drivers, either. I won't bore you with the details, but installing the PCMCIA drivers in a Thinkpad was nothing less than an adventure.

A notebook is ludicrous without a modem connection. Why not build the modem onto the motherboard and drop the PCMCIA solution? While it seems nifty that the PCMCIA slot is forever being reengineered to become a full-featured bus, the slot's use as such stinks. The PCMCIA should stick with its

original purposes: memory expansion and substitute floppy disk. Programs were supposed to be shipped on PCMCIA cards for use on notebooks that did not have floppy disk drives. Expansion memory was supposed to be available on PCMCIA cards. Instead, we have expansion memory added to the motherboard and the PCMCIA slot used as a floppy disk controller!

I think everyone is missing the point about mobile computing. The PCMCIA modem is a bonehead trend, and it should be discontinued.



Delicate connectors don't work for rugged mobile computing. The best solution is the original solution.



Announcing the latest breakthrough in high-performance notebook computers—the TravelMate 4000E WinDX4/75.



The new TI TravelMate 4000E WinDX4/75MHz notebook. With its IntelDX4 processor, you have the power to be more productive.

At Texas Instruments, we've listened to your needs. That's why we've created a way for you to work faster and increase your productivity — with the new TravelMate WinDX4/75 active matrix color notebook computers.

You'll find a lightning-fast 75MHz IntelDX4 processor inside. Combined with our innovative system architecture, your new TravelMate will scream with speed. And with 3 to 5 hours of battery life and a 455MB hard drive, you can be more productive even when you're on the go.

Finally, with so many high-performance features packed in, who needs a desktop PC? The TravelMate 4000E WinDX4/75 does it all. To learn where you can reserve yours today, simply call **1-800-TI-TEXAS** (1-800-848-3927), after all, they're going fast.

TRAVELMATE 4000E SERIES NOTEBOOKS

DISPLAY	PROCESSOR	MEMORY†
Active Matrix Color (9.5")	IntelDX4-75MHz	4MB RAM/455MB HDD
Active Matrix Color	IntelDX4-75MHz	4MB RAM/340MB HDD
Active Matrix Color	486DX2-50MHz	4MB RAM/200MB HDD
Dual Scan Color	486DX2-50MHz	4MB RAM/200MB HDD
Color	486DX2-40MHz	4MB RAM/200MB HDD
Color	486SX-25MHz	4MB RAM/120MB HDD
Monochrome	486DX2-50MHz	4MB RAM/200MB HDD
Monochrome	486SX-25MHz	4MB RAM/120MB HDD

TRAVELMATE INTELLIGENT DOCKING SYSTEM

COMPATIBILITY	EXPANSION	INTERFACES
TI TM4000E	Six 16-bit ISA slots,	Parallel/2 Serial, VGA,
Series Notebooks	two PCMCIA Type III	Mouse, keyboard, game
	slots, four drive bays	port and RJ-11 jack

† RAM expandable to 20MB with optional memory

TravelMate, WinDX4, and "Extending Your Reach With Innovation" are trademarks of Texas Instruments. Intel DX4 is a trademark and the Intel Inside logo is a registered trademark of Intel Corp. © 1994 TI

EXTENDING YOUR REACH
WITH INNOVATION™

 **TEXAS
INSTRUMENTS**
CIRCLE 353 ON READER SERVICE CARD

Inside Track

W

hen things get **hectic**, Intel Corp. talks about the future. And that's exactly what the company is doing as Andy Grove floats around discussing the P6—the unnamed chip that will follow the Pentium in 1996 or so. I'm of the opinion that the company will call this newest chip the Pentium II or **Pentium/2** or some such thing. The current marketing strategy at Intel is clear: Promote the Pentium name. So don't expect Intel to change to a new name anytime soon. Perhaps we'll still be seeing the Pentium moniker into the next century. Intel finally has a brand name it can keep away from the competitors. No more pesky trademark battles.

Anyway, the new P6 is going to be a 0.4-micron chip utilizing 4 million transistors running at well over 100 MHz. It's supposed to be capable of **300 or more MIPS** (million instructions per second). That should be adequate for the next generation of **bloated code-based**, sluggish applications we can expect from the software community.

Meanwhile, it's now obvious that IBM wants to shy away from the **Intel juggernaut**, especially since Intel is making more and more raw OEM systems. If you buy a Pentium from just about any vendor, including Gateway, you will more than likely discover that it's a box built completely by Intel. I've been playing with one of these Intel-built machines, and it's impressive. I borrowed one from Insight Computers (Tempe, Arizona), and the people there told me that nowadays it's **foolish** not to outsource the manufacturing of these Pentium machines. Intel is making so many of these that it's hard to beat their price. But what becomes of product differentiation if Intel makes the chips and makes the machines? Well, that's what IBM is asking itself.

IBM has decided to try and derail the market by tossing an interesting PowerPC system into the market. This one will use the newest iteration of the PowerPC, the 615. This chip directly decodes 486 instructions on the chip, making it **completely compatible** with the current source code running on the Intel family of chips. If the price is right, users may flock to the new platform. This assumes IBM can get the system into the marketplace soon.

Code Name Mania Dept.: If you haven't noticed, unannounced products under development by a computer company are usually given a secret code name. The original idea behind this code name was to

*IBM has decided to
try and derail the
market with a new
PowerPC system that
directly decodes
486 instructions. If
the price is right,
users may flock to the
new platform.*

keep spies from figuring out what the company was up to. To prevent leaks, a company would use a multitude of code names to see which group had the **loosest lips**. Over the past decade, it's become apparent that code names are now nothing more than marketing tools. Apple, for example, had so much trouble shaking the not-so-secret **Macintosh code name** for its computer that the company ended up using Macintosh as the product name. But no company has done more with code-name marketing than Microsoft. Daytona, Chicago, and Cairo come to mind. Proof that these code names are **contrived marketing tools** was revealed on-line recently when a German CompuServe user mentioned that

Daytona is code-named NT 3.5 in Germany "because nobody knows where Daytona is." If it's a code name, then who cares what the Germans know about the city or its location? One hopes this **silly game** will come to an abrupt end.

Genuinely Interesting Software Dept.: A friend of mine called me a month ago telling me that he had made the mistake of booting his machine on a Sunday when that old **Michaelangelo virus** would activate. It did. No backups, either. In time for next year's outbreak, it's not too late to get what's considered by almost all experts to be the current state-of-the-art anti-virus package on the market: Integrity Master from Stiller Research (2625 Ridgeway St., Tallahassee, FL 32310, U.S.A.; phone, 800-788-0787, 314-256-3130). In a side-by-side comparison, this product beats everything on the market. With its built-in scanner, Integrity Master will not only find every known virus, it will also handle polymorphic and other odd virus types. **This is the anti-virus software I use.** It's only \$39.95 in the U.S. and \$44.50 elsewhere. Shipping and handling is included in the price. Get this package and you will be glad you did.

OK, What Next Dept.: I was amused by this item. Now that AT&T owns NCR, it will change the name of NCR (which has been NCR for over 100 years) to AT&T Global Information Solutions. This is a **cute idea** because when Tom Watson quit NCR to form IBM Corp. eventually, he named his new company International Business Machines, a moniker that was a **superset** of National Cash Register: International, not National; and Business Machines rather than just Cash Registers. So AT&T ups the ante. We now have Information Solutions instead of Business Machines, and Global instead of International. What next? Intergalactic? My comment: Sheesh! □



NOW YOUR PRESENTATIONS CAN BE AS EASY AND EFFECTIVE AS THEY USED TO BE.

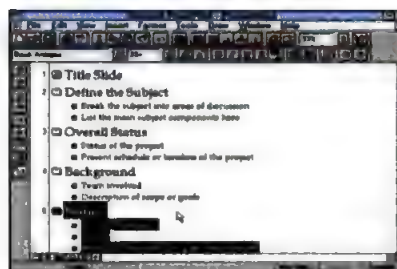
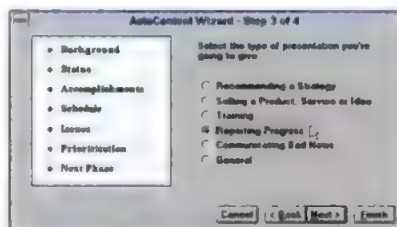
Introducing Microsoft PowerPoint 4.0.

Remember when presentations were no big deal? Organizing your material was a cinch. You always made an impact on the crowd.

Welcome back to simpler days, with new Microsoft PowerPoint presentation graphics program 4.0. The easy way to create powerful, convincing presentations that produce the results you want.

Getting started is always the hard part, right? Not anymore.

Using an innovative feature called AutoContent Wizard, pick a



With AutoContent Wizard, first select a presentation type, then simply enter your content in the outline provided.

presentation type. Then, the Wizard helps you quickly turn your ideas into a fully formatted presentation.

It's all part of IntelliSense™ technology, built-in intelligence that makes routine tasks automatic and complex tasks easier: a unique feature of the Microsoft Office family.



Get your point across clearly. On paper, overheads, slides or electronic presentations.

For more help, you don't have to look far. AutoLayout makes it easy to add new slides, with 21 formats, including two-column text and tables. Finally, use Rehearsal to practice your presentation against the clock. So you're sure to cover your points in the allotted time.

The fact is, PowerPoint 4.0 is so easy to use, you may already know how. Why? Over 100 PowerPoint tasks are done exactly the same way in Microsoft Excel and Word. And now with OfficeLinks, turn a Word 6.0 document into a presentation in PowerPoint with a click.

All told, new PowerPoint 4.0 makes it easy to give more effective presentations. So you'll once again master the art of show-and-tell. Visit a reseller or to find one near you call (800) 695-2850, Dept. KZ8.



Microsoft Office

"They Can Network Me.

Make Me Interactive.

Even put Me

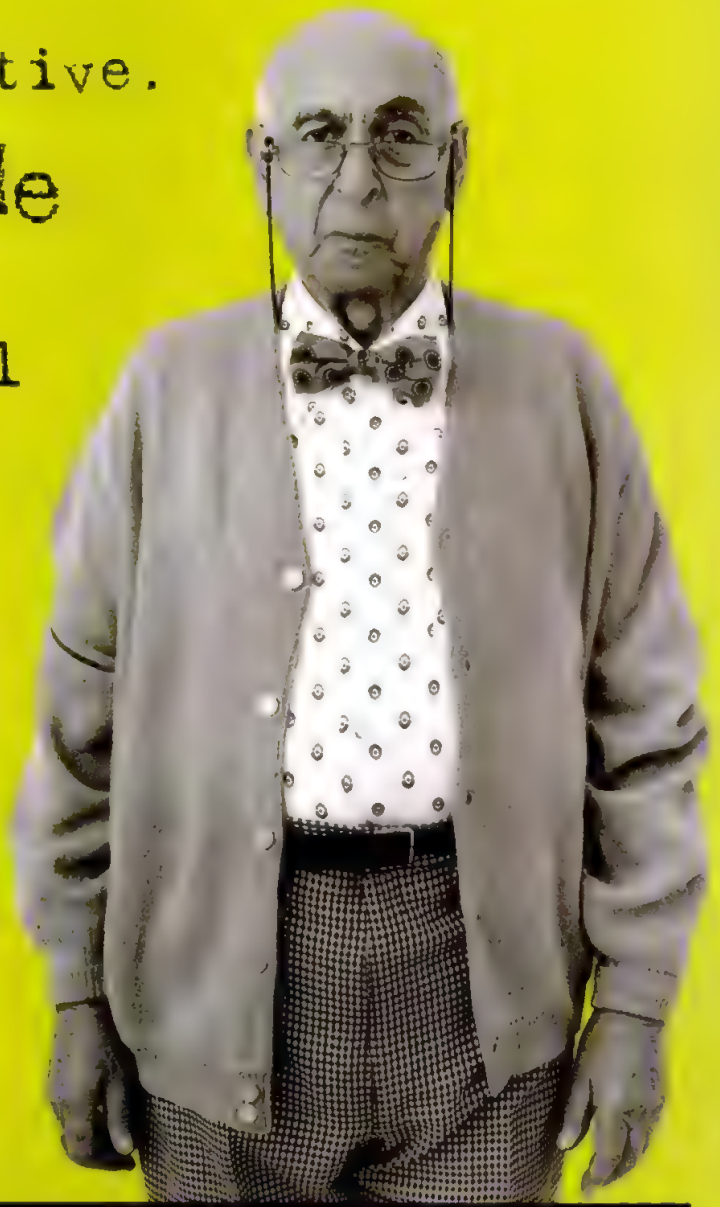
On Some Digital

Expressway. Can't

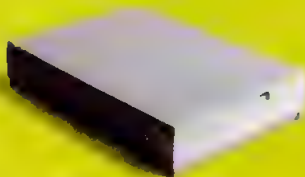
Someone just

Cure My

Scanaphobia?"



Autoscan



The IX-4015 Color Scanner
for the PC or Mac*

Yes. Introducing the Canon® IX-4015 Color Scanner. Its remarkable Autoscan feature produces professional quality scans in just one step. And with its easy to use OFOTO® version 2 software, small footprint, and affordable price, you'll find this powerful business tool a pleasure – not a pain. Now, we could load you up with all the great technical details, but that might scare you away. Instead, just see the IX-4015 at your local Canon dealer, or call us at 1-800-848-4123. Unless of course, you have "telephobia".

Canon



Jim Seymour

What's Wrong with CD-ROMs

I really like CD-ROMs. I mean, I *really* like them. I've been a booster of CD-ROMs for years. And after saying for two years that CD-ROMs should replace the 5.25-inch floppy disk drives usually installed in new PCs, I now see it starting to happen. I feel

a powerful sense that the revolution is finally getting underway.

But oh, how I also *hate* CD-ROMs. Why? Because there are so many hindrances to their usefulness, so many areas that still need improvement.

CD-ROMs are way too slow. Even with the newest triple- and quadruple-speed drives, CD-ROMs are still too slow. I know that this is a perceptual thing. It's much faster to look something up in Microsoft Encarta (the new version is an improvement over Encarta's grocery-store-encyclopedia origins) or in the latest edition of Compton's Multimedia Encyclopedia (also newly updated and substantially improved) than it is to walk across the room, find the right volume of a print encyclopedia, and rummage around until I find what I need.

But by computer standards, CD-ROM drives are still way too slow. Buy the fastest drive you can afford, put Corel's CDX cache routine (from Corel's invaluable CD PowerPack package) on your PC, and then pray for the development of better indexing, search, and compression routines. Because even the best hardware can't fully overcome CD-ROM software's sluggishness.

CD-ROMs still have too many compatibility problems. I get at least a dozen new CD-ROM releases a week. Almost all get installed, if only briefly, on a PC in my office. (I confess I never quite get around to those "Swine Update '94" and "Carp Farming in Bratislava" titles.) But *which* PC? Disk A will install on PC number 1, but the sound won't play. It will install on PC 2 but locks up when I click on the section of the disk I want to go to. It will install on PC 3 but runs far too slowly to be useful. And it won't install at all on PC 4. This is stupid and unforgivable.

CD-ROMs ask too much of me and my PC at installation time. Ideally, I ought to be able to pop a new CD-ROM into the drive, use the instructions or File Manager to find the name of the .EXE file that creates an icon in Program Manager, double-click on that .EXE, and then run the program in its entirety from the CD-ROM. Hah! Ideal but rare. The typical install routine seizes a few megabytes of my hard disk, decompresses a long list of files into its own newly created subdirectory, creates YANPGIDW (yet another new program group I don't want), and then wheezes to a stop. This is not how it's supposed to work, folks.

CD-ROMs too often come with klutzy old DOS interfaces. Sure, the new title from Dogbreath Data *installs* from Windows, but when I click on its icon, I see an ugly, character-based display right out of 1981. Or 1971. Or 1961.

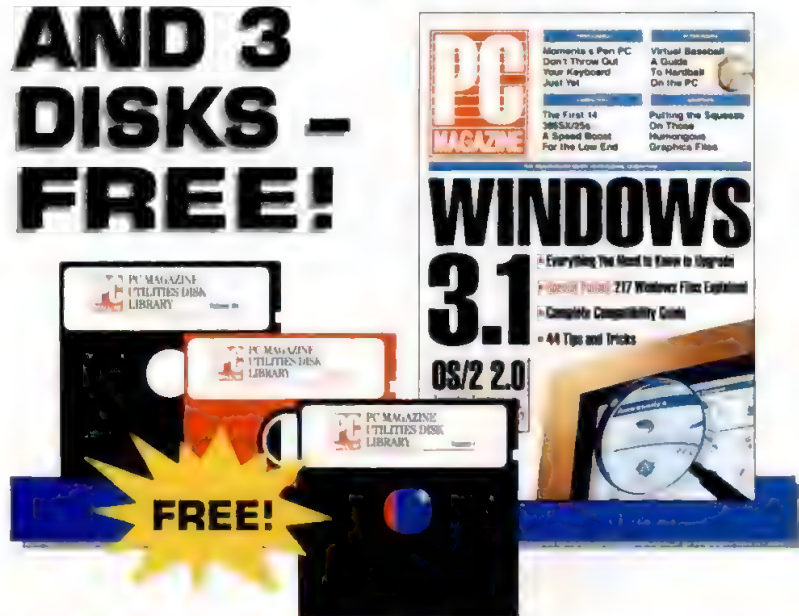
CD-ROMs don't have to have elaborate interfaces. When you're accessing a big database—which is what most business CD-ROMs are—you don't need cutesy windows, sound effects, and birdies fluttering across the screen. But you *do* need a display that is not radically different from the other Windows titles you use and that doesn't force you to figure out how to do everything all by yourself. For example, ProPhone is one of my favorite CD-ROM titles. An up-to-date list of the names, addresses, and telephone numbers of essentially every residence and business in the country, it's a great resource and a bargain too boot. But until recently, ProPhone shipped with a god-awful DOS interface. A rich and valuable product was hobbled by the developer's failure to bring it into the 1990s. Some good news: ProPhone's new Windows interface should finally ship by the time you receive this issue. Better late than never, but...



There's much to like about CD-ROMs, but there's also plenty of room for improvement.

GET NONSTOP SYSTEMS INFORMATION...

AND 3 DISKS - FREE!



Don't miss a single product report or productivity-enhancing tip — subscribe to PC Magazine today. You'll get 22 issues for only \$29.97 — that's 54% off the \$64.90 cover price! Better yet, sign up for two years and get 44 issues for just \$49.97 — a savings of 62%!

Order now and you'll also get **PC Magazine's "Utilities Disk Library" on 3 disks — FREE** with your paid subscription. These 103 utilities, selected especially for new subscribers by PC Magazine's editors, let you up-grade your system, boost your PC power, and simplify tasks — all at the touch of a key. This exclusive software is available *only* to new subscribers!

ONE YEAR

(22 issues) for \$29.97.
YOU SAVE 54%!

TWO YEARS

(44 issues) for \$49.97.
YOU SAVE 62%!

**Call toll-free today:
1-800-289-0429**

Basic one-year subscription \$44.97; on newsstands \$64.90. Canada and foreign add \$32.00 per year. U.S. funds only. Canadian GST included. Please allow 30 days for shipment of first issue. FREE disks will be sent upon payment.

Jim Seymour

Looking for a good example of a spare but effective Windows interface for a data-filled CD-ROM? Take a look at Ziff-Davis's Computer Select. (Computer Select is, of course, published by the same company that publishes *PC Magazine*.) Computer Select has evolved from an ugly and extremely clumsy display to an extremely attractive and simple yet enormously powerful interface.

CREATIVITY WINS

CD-ROMs don't need to have standard interfaces. Developers take note: Microsoft's interface cops aren't going to sweep down on you in the dark of night. Use your creativity. Look at DeLorme's Street Atlas USA, Version 2.0, which has as nontraditional a Windows interface as you're likely to find. It may be nontraditional, but its zoom-in and zoom-out arrows, its cross hair, and its compass rose are about as intuitive as interfaces get.

Or look at Microsoft's Cinemania 1994. It looks like nothing else out of Redmond, but it works. No manual needs to tell you how to find and play audio or video clips, search for films by your favorite actor or director, or look up reviews by Roger Ebert or Leonard Maltin before you head out to the video store.

Or maybe best of all, look at any of Broderbund's Living Books titles—especially, Arthur's Teacher Trouble. Even if you buy or produce CD-ROMs strictly for business use, you should still take a look at this gem. It bends the notion of a computer interface to its own purposes, forsaking buttons, scroll bars, and drop-down menus in favor of funny and sometimes outrageous animations and sound clips, which are often hidden by deceptively ordinary objects. (Click on the monkey doll on the shelf in Arthur's bedroom and the little ape gets electrocuted as a lamp falls over on it. Zaaappppp!)

What we need in CD-ROM interfaces is not just a move away from a heritage of ugly character displays—though that's surely the first step—but a reinvention of interfaces, of how we ask computers to gather and display information for us.

Until all interfaces have been reinvented, CD-ROMs are going to make me as angry as they make me happy.

Excuse me for a minute. I've gotta cool off. I'm going to go back in Arthur's room and click on his map of Africa. □



If Networks Were Founded On The Idea That People Work Better Together, Why Install Modems That Work Apart?

It seems obvious, doesn't it? The better your modems work together, the better your LAN and your remote users will work together.

Simplify Your Network. Total Control™ is a modem pool that simplifies your network by integrating all your modems – and the functions of several other components – in one elegant chassis. And because Total Control is the only modem pool with an SNMP management system, you can monitor and test all of your network components from a single PC.

U.S. Robotics' renowned core modem technology is the foundation of Total Control's modem pool. Which means Total Control gives you exclusive features like QuickConnect™ and Adaptive Speed Leveling (ASL)™ – features designed for maximum throughput, minimized phone line costs and increased chassis utilization.

Your Data Will Be Safe, Too. Total Control's integrated security system is designed to keep hackers from getting into your network – and control who's dialing out.

It's not only the simplest, most powerful modem pool available now. It's a modem pool with the future built in. You can upgrade

Total Control's modems to V.34 (28.8 Kbps) in minutes. And, when you're ready to go digital, Total Control can be easily reconfigured to accommodate T-1, ISDN and Switched 56K service.

Modems Work Better Together. Just like people. The people at U.S. Robotics are ready to work with *you* – to design the WAN solution that will help you be more productive, save you access costs, and put you in control. Total Control. For more information, call 1-800-USR CORP today.

TOTAL CONTROL Now With SNMP



U.S. Robotics
The Intelligent Choice in Data Communications

1-800-USR CORP

CIRCLE 920 ON READER SERVICE CARD

U.S. Robotics and the U.S. Robotics logo are registered trademarks of U.S. Robotics, Inc. Total Control, QuickConnect and ASL (Adaptive Speed Leveling) are trademarks of U.S. Robotics.

TECHNOLOGY

R U N S I N O U R F A M I L Y



SEMICONDUCTORS TO SYSTEMS

Micron Systems offer you a unique built-in feature — a family tradition of technical excellence.

This tradition began 15 years ago when Micron introduced its 64K DRAM. Today Micron is among America's largest memory manufacturers and produces a full line of award-winning high-performance personal computer systems. Micron currently employs more than 5,000 people with facilities spanning over a million square feet worldwide.



Micron
16 Meg
DRAM

AWARD-WINNING PERFORMANCE

In 1993 alone, Micron brought home an impressive array of industry awards. Micron's newest semiconductor facility was named "Top U.S. Fab of 1993" by Semiconductor International Magazine; Micron computer systems were awarded a PC Magazine Editors' Choice; PC World's Best Buy; Windows Sources' Experts' Pick; and Byte Magazine's Best Value for both Windows and UNIX applications. PC Digest gave Micron systems a 4-star rating based on performance and price. In PC Magazine's 1994 Readers' Choice Service & Reliability Awards

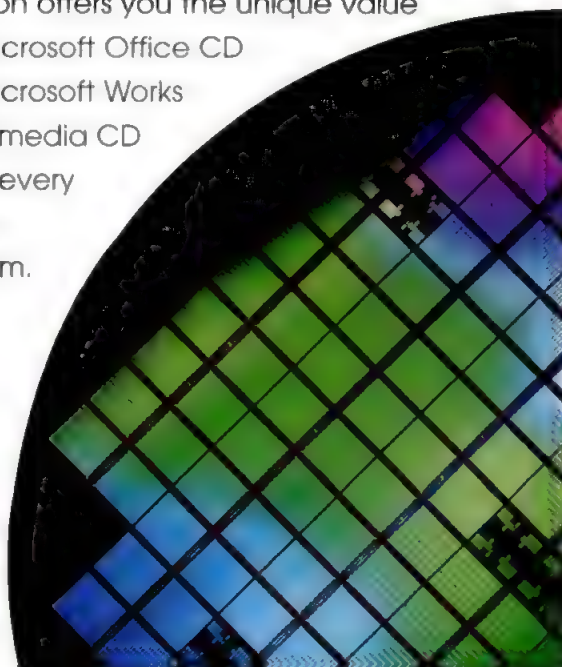
Micron received the highest ratings available in the categories of Overall Reliability, Satisfaction with Technical Support and Future Likelihood of Buying again. That's why Autodesk selected Micron as PC supplier for 1994 tradeshow.

STRONG FAMILY TIES

Micron customers benefit from strong ongoing relationships with industry leaders such as Intel™ and Microsoft. Micron is leading the industry with systems featuring Intel's new DX4 100MHz microprocessor with up to 50% greater performance than any previous 486. Micron also brings you systems that combine Intel's 66MHz Pentium™ microprocessor with the enhanced performance of PCI/EISA bus architecture. Since the finest hardware deserves the finest software, Micron offers you the unique value of Microsoft Office CD or Microsoft Works Multimedia CD with every new system.

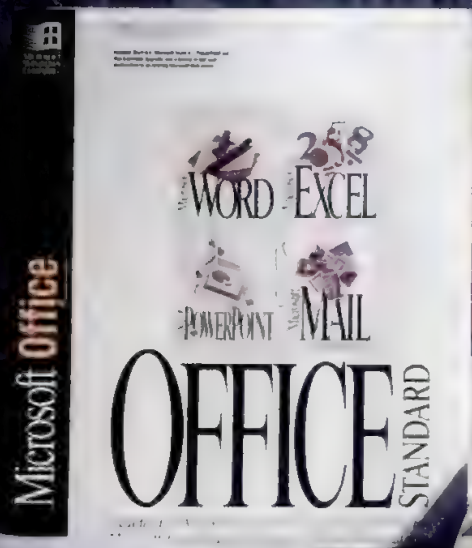
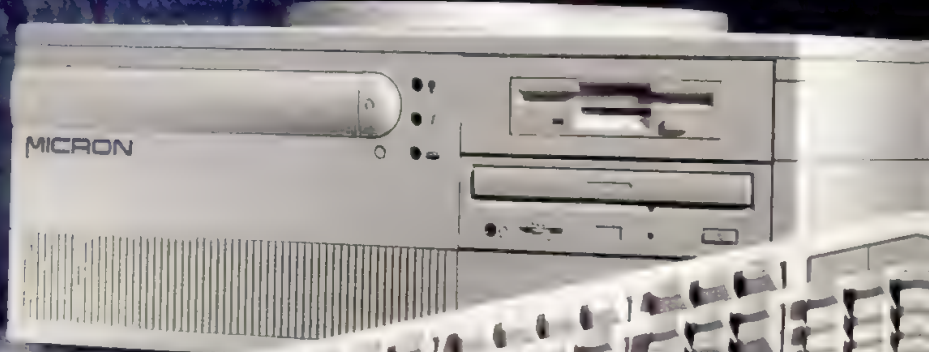


MICRON



80MHz PENTIUMS
NOW AVAILABLE!

100MHz...
Your office
never ran
so fast!



MICRON
SEMICONDUCTORS TO SYSTEMS

PERFORMANCE...

100MHz PCI SYSTEMS

100MHz Systems from Micron

Micron's new 4100PCI Magnum 100MHz DX4 systems give you Pentium performance at 486 prices. PCI Bus architecture maximizes the speed of this new processor to give you up to 50% greater performance over 66MHz DX/2 systems.

4100PCI MAGNUM

- Intel DX4 100MHz processor
- Pentium Technology Ready (ZIF)
- 8MB RAM, 420MB 14ms PCI IDE HD
- 256K 15ns write-back cache, Flash BIOS
- 4 ISA, 2 PCI, 1 ISA/PCI slots
- 2X CD-ROM drive, 3.5" floppy drive
- PCI graphics accelerator (2MB)
- 14" Micron 14FG, 1024NI, .28mm, MPRII
- Desktop "Tool Free" chassis
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Works Multimedia on CD

\$2,399

LEASE - \$67/MO.

16MB RAM, 527MB hard drive
15" Micron 15FG, MS Office CD

\$2,999

LEASE - \$109/MO.

NEW



Microsoft Office for Windows on CD



Microsoft
OFFICE
STANDARD

Most Micron systems ship standard with Microsoft's latest version of Office on CD, including on-line documentation. You get Microsoft Word, Microsoft Excel, Microsoft

PowerPoint presentation graphics and Microsoft Mail in this award-winning suite. Full documentation pressed on a single CD brings complete manuals on-line at the click of an icon.

4 Year On-Site Warranty from General Electric

Order the optional General Electric Service Protection

Plus warranty when you purchase any new Micron system

and get service, parts and labor coverage for your entire system, including the monitor! Call your Micron representative today for details.



Micron Credit Card
CALL FOR DETAILS

MICRON
COMPUTER, INC.
800-388-6334

Autodesk
PC supplier for Autodesk's 1994 tradeshows

A MICRON TRADITION

MEMORY UPGRADES



**MICRON
MEMORY EXPRESS**

Factory-Direct Memory Upgrades

Micron has built an industry-wide reputation as a leading American manufacturer of high-quality DRAMs, SRAMs and VRAMs. Now you can purchase memory upgrades for your new or existing personal computer - direct from Micron!

- Reliable supply of quality components
- Wide variety of configuration choices
- Fast Federal Express delivery
- Factory-direct pricing

800-388-6334
**CALL NOW! FOR FACTORY
DIRECT PRICING.**

Micron 66MHz Pentium PCI/EISA

P66PCI POWERSERVER

- Intel Pentium 66MHz processor
- 16MB RAM upgradeable to 192MB
- 512K 15ns write-back cache
- 527MB 12ms SCSI-2 hard drive
- PCI 32-bit Fast SCSI-2 controller
- 1Mb Flash BIOS by Phoenix
- 5 EISA, 2PCI, 1 EISA/PCI slots
- 2X SCSI-2 CD-ROM drive, 3.5" floppy
- PCI graphics accelerator (2MB)
- 14" Micron 14FG, 1024NI, .28mm, MPRII
- 2 16550 serial ports, 1 parallel port
- Tower: 10 drive bays, 3 cooling fans
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Office for Windows on CD*

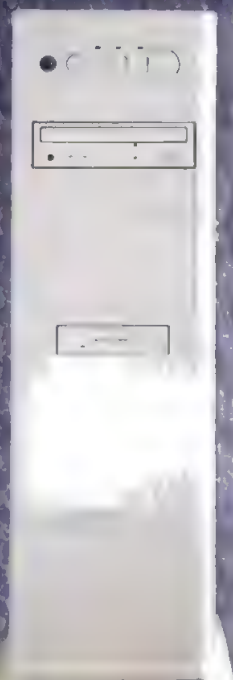
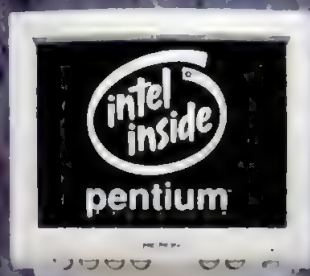
\$3,799 LEASE - \$132/MO.

32MB RAM
1.0GB SCSI-2 HD
15" Micron 15FG

\$4,599 LEASE - \$169/MO.

64MB RAM
2.0GB SCSI-2 HD
17" Micron 17FGx

\$6,999 LEASE - \$257/MO.



AWARD-WINNING BY DESIGN

4100VL MAGNUM

- Intel™ DX4 100MHz processor
- Pentium™ Technology Ready (ZIF)
- 8MB RAM (expandable to 64MB)
- 420MB 14ms IDE hard drive (VLB)
- 256K 15ns write-back cache, Flash BIOS
- 7 expansion slots: 2 VESA, 7 ISA
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond SpeedStar Pro VLB (1MB)
- 14" Micron 14FG, 1024NI, .28mm, MPRII
- Desktop "Tool Free" chassis
- EPA Energy Star compliant
- Microsoft® Mouse, 101-key keyboard
- MS-DOS® & Windows® for Workgroups
- Microsoft Works Multimedia on CD*

\$2,249 LEASE - \$79/MO.

433VL MAGNUM

- Intel 486DX 33MHz processor
- Pentium Technology Ready (ZIF)
- 8MB RAM (expandable to 64MB)
- 420MB 14ms IDE hard drive (VLB)
- 256K 15ns write-back cache, Flash BIOS
- 7 expansion slots: 2 VESA, 7 ISA
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond SpeedStar Pro VLB (1MB)
- 14" Micron 14FG, 1024NI, .28mm, MPRII
- Desktop "Tool Free" chassis
- EPA Energy Star compliant
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Works Multimedia on CD*

\$1,899 DX2 66MHz - ADD \$150
LEASE - \$69/MO.

433VL VALUELINE

- Intel 486SX 33MHz processor
- Pentium Technology Ready (ZIF)
- 4MB RAM (expandable to 32MB)
- 210MB 14ms IDE hard drive
- Upgradeable cache (to 256K)
- 6 expansion slots: 2 VESA, 6 ISA
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond SpeedStar Pro VLB (1MB)
- 14" Micron 14FG, 1024NI, .28mm, MPRII
- Desktop "Tool Free" chassis
- EPA Energy Star compliant
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Works Multimedia on CD*

\$1,399 LEASE - \$51/MO.

P66PCI POWERSTATION

- Intel Pentium 66MHz processor
- 8MB RAM (expandable to 128MB)
- 420MB 14ms IDE hard drive
- PCI 32-bit IDE interface
- 256K 15ns write-back cache
- 1Mb Flash BIOS by Phoenix
- 4 ISA, 2PCI, 1 ISA/PCI slots
- 2X CD-ROM drive, 3.5" floppy
- PCI graphics accelerator (2MB)
- 14" Micron 14FG, 1024NI, .28mm, MPRII
- 2 16550 serial ports, 1 parallel port
- Desktop "Tool Free" chassis, 3 cooling fans
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Office for Windows on CD*

\$2,799 LEASE - \$102/MO.

- 16MB RAM
- 527MB hard drive
- 15" Micron 15FG

\$3,199 LEASE - \$111/MO.

- 16MB RAM
- 527MB SCSI-2 HD
- 15" Micron 15FG

\$3,499 LEASE - \$121/MO.

- 32MB RAM
- 1.0GB SCSI-2 HD
- 17" Micron 17FGx

\$4,799 LEASE - \$167/MO.



466VL MAGNUM

- Intel 486DX2 66MHz processor
- Pentium Technology Ready (ZIF)
- 16MB RAM (expandable to 128MB)
- 527MB 12ms IDE hard drive (VLB)
- 256K 15ns write-back cache, Flash BIOS
- 7 expansion slots: 2 VESA, 7 ISA
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond Viper VLB (2MB VRAM)
- 15" Micron 15FG, 1280NI, .28mm, MPRII
- Desktop "Tool Free" chassis
- EPA Energy Star compliant
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Office for Windows on CD*

\$2,799 DX4 100MHz - ADD \$200
LEASE - \$102/MO.

UPGRADES

HARD DRIVES

- 527MB 12ms IDE (from 340MB IDE) add: \$100
- 1.0GB 10ms SCSI-2 (from 527MB IDE PCI) add: \$500
- 1.0GB 10ms SCSI-2 (from 527MB SCSI-2) add: \$200
- 2.0GB 9ms SCSI-2 (from 1.0GB SCSI-2) add: \$800

MONITORS

- Micron 15FG (upgrade from 14FG) add: \$100
- Micron 15FGx (upgrade from 15FG) add: \$50
- Micron 17FGx (upgrade from 15FGx) add: \$350

GRAPHICS ACCELERATORS

- Diamond Viper 2MB PCI add: \$200
- Matrox MGA-II 2MB PCI add: \$200

MISCELLANEOUS

- Tower Chassis (upgrade from desktop) add: \$100
- 14,400 Bd. Int. Fax/Modem add: \$130
- 16-Bit Sound Card
MS Encarta & Speakers add: \$130
- Altec Lansing ACS-300
Speakers w/Subwoofer add: \$250
- 250MB Tape Backup W/tape add: \$150
- 2.0GB SCSI-2 DAT Tape Drive add: \$900
- CalComp Drawing Board III
12"x12"/16bitn. add: \$250

All upgrades available with system purchase only

*MS-WORKS AND OFFICE DOCUMENTATION ON-LINE.
HARD COPY AVAILABLE FOR ADDITIONAL CHARGE.



- NEXT DAY SHIPPING ON SELECTED SYSTEMS
- 30 DAY RISK-FREE MONEY BACK GUARANTEE
- ONE YEAR EXPRESS PARTS REPLACEMENT
- LIFETIME TOLL-FREE TECHNICAL SUPPORT
- ON-SITE SERVICE OR SYSTEM REPLACEMENT



MICRON
COMPUTER, INC.

800-388-6334

CIRCLE 119 ON READER SERVICE CARD

MON-FRI 7AM - 8PM, SAT 8AM - 5PM(MST) • 915 E. Karcher Road • Nampa, Idaho 83687 • (208) 465-3434 • FAX (208) 465-3424

©1994 Micron Computer, Inc. All rights reserved. All prices and specifications subject to change without notice. Micron Computer, Inc. cannot be responsible for omissions, errors in typography or photography. Intel, Intel Inside, Pentium and Overdrive are registered trademarks of the Intel Corporation. Microsoft is a registered trademark and Windows, Windows NT and the Windows logo are trademarks of Microsoft Corporation. The Energy Star emblem does not represent EPA endorsement of any product or service. All other company trademarks are trademarks of each respective company. Prices do not include shipping and handling. 30 day risk-free money back guarantee does not include return freight or shipping and handling charges, applies only to Micron-branded products, and begins from date of shipment. All returns require RMA numbers and must be shipped in the original condition prepaid and insured. Lease prices based on 36-month lease.



Bill Howard

Ready to Reap What Intel Sows?

CPU's are so cheap today that it doesn't make any sense to buy a PC with a processor slower than a 486DX2/66. By year's end, I believe the only desktop PCs that will be able to justify prices above \$2,000 will be those with Pentium processors. As you

probably know, Intel announced a slew of fast new chips in early March (conveniently timed a week before the unveiling of Apple's PowerPC-based PowerMac). Confused by all the Intel processors? Wondering where they fit in and if you can upgrade your existing PC with one of them? Here are some specifics:

486SX2/50. This is a clock-doubled 486SX CPU that runs at 50 MHz internally and 25 MHz externally; it has no math coprocessor. This chip's purpose in life is to get down and dirty with Intel-compatible CPUs from AMD, Cyrix, IBM, and Texas Instruments. It should appeal to the more cost conscious.

486DX2/66. Same old chip, new positioning: the entry level for home or business use. That's Intel's hype, and it's on target. Buying a less powerful CPU—say, a 486/33—will cost you money in the long run, because you'll run out of power and need to upgrade sooner.

DX4. These are the so-called clock-tripled 486DX CPUs. These CPUs actually run at 2, 2.5, and 3 times the external-bus speed, but Intel chose to name them *DX4* to remind you of the 486. These are all 3.3-volt chips with 16K on-chip caches (earlier 486s have 8K). The one you want is the 486DX4/100 with a 33-MHz external bus. You'll see DX4 Winstone 94 scores reaching into the 80s; this compares with scores in the 50s for DX2/66s.

The DX4/83 runs at 2.5 times its 33-MHz external-bus speed, but it's an odd duck, and I wonder about its future. Then there's the DX4/75, which triples its 25-MHz external-bus speed and is intended for portables. It's only a tad faster than a DX2/66, because its external bus is slower (25 MHz versus 33 MHz).

P54C. This is the code name for Intel's newest Pentium CPUs that will run at either 90 or 100 MHz internally and communicate

with a PC's bus at 60 or 66 MHz. They operate at 3.3 volts rather than 5 volts, which means you've finally got a Pentium you can use in a laptop.

We've seen 90-MHz Pentiums top 110 on Winstone 94. Intel says it will continue to make and sell the hot-running, 5-volt, 60- and 66-MHz Pentiums indefinitely, but I suspect the 486DX4/100's performance comes too close for comfort—too close, that is, to make the first-generation Pentiums long-term players.

The 100-MHz Pentium chip is supply-constrained and will initially go into file servers. But this makes little sense, since the CPU isn't usually the most stressed component in a file server.

P24T, P54CT, OverDrive. OverDrive is the umbrella term for Intel's upgrade CPUs. The *P24T* code name refers to the 486-to-Pentium upgrade, and *P54CT* refers to the Pentium-to-Pentium upgrade. Most of the new chips can upgrade existing 486s and even first-generation Pentiums. They'll have on-chip voltage regulation to make the 3.3-volt CPU run in a system supplying 5 volts to the CPU socket.

An Intel Verification Labs process will certify which existing PCs can accept which upgrade chips, either as

plug-in CPU replacements or as add-ons via the empty OverDrive sockets. If the upgrade works, it will be listed in a booklet available for your perusal at any dealer selling OverDrive CPUs.

It's still going to be a crapshoot: You will be able to upgrade some PCs, but not others. Even if the upgrade can be made to work, you'll still want to determine whether the system is up-to-date enough in other respects—hard disk size, video speed, bus design—to make it worthwhile. I think you're almost always better off buying a whole new system. □



It's time to harvest the latest crop of Intel microprocessors—new chips that will speed things up.

AMBRA

1-800-200-3197

In Canada, 1-800-363-0066, Ext. 3197



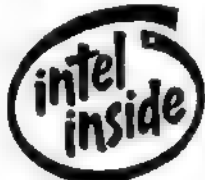
Weekdays 8 am to 11 pm
Weekends 10 am to 7 pm (ET)



D4100I/VL

- ✓ 486DX4, 100 MHz
- ✓ Upgradable to Intel® Pentium™ technology
- ✓ 16KB L1 cache
- ✓ 256KB WriteBack L2 cache
- ✓ 8MB RAM, max: 64MB
- ✓ 4 16-bit ISA, 1 32-bit VL bus slot
- ✓ Fast, cost-effective upgrade to PCI
- ✓ 440MB (12ms) IDE hard disk
- ✓ 5 drive bays
- ✓ Local bus IDE controller
- ✓ Local bus graphics accelerator, 1MB
- ✓ 15" FST-NI color monitor, LR
- ✓ 3.5" 1.44MB diskette drive
- ✓ Lexmark™ PS/2®-style 101-key keyboard
- ✓ MS-DOS® 6.2, Windows™ 3.1, mouse

\$2,529



T4100I/VL MINITOWER

- ✓ 540MB (12ms) IDE hard disk
 - ✓ 7 16-bit ISA, 1 32-bit VL bus slot
 - ✓ 6 drive bays
 - ✓ 2X Multisession CD-ROM
- \$2,859** (Add just \$200 for 16-bit sound card, speakers and choice of CD 5-packs. Call for details.)

Why AMBRA.

IBM® TECHNICAL SUPPORT:
TOLL FREE, 24 HOURS,
7 DAYS A WEEK!

OPTIONAL
IBM ONSITE SERVICE:
ONLY \$29 FOR 1 YEAR!²

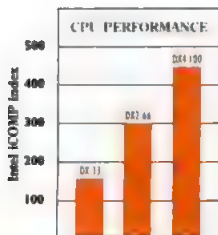
CUSTOM CONFIGURATION
AT NO EXTRA SERVICE
COST!

30-DAY MONEY-BACK
GUARANTEE,
1-YEAR LIMITED
WARRANTY!³

SPEED RIGHT NOW. CHANGE LANES WHENEVER.



¹ Offerings may differ in Canada. ² \$29 for first year. Please call for further details. Onsite service may not be available in certain locations. ³ Please call for details regarding AMBRA's money-back guarantee and limited warranty. Return shipping and insurance are the responsibility of the customer. ⁴ Dell and Gateway numbers reported in PC Magazine, 12/7/93. AMBRA results independently tested 1/31/94



100 MHz DX4 CPU: Intel's fastest 486! Upgradable to Pentium technology tomorrow. Nearly 50% speedier than DX2 66 MHz processors today.

16KB L1 cache: Twice as much as provided by DX2 66 CPUs — teamed with 256KB L2 WriteBack for a big payoff in processor performance!

D4100I/VL: 100 MHz 486. FIRST UPGRADABLE LOCAL BUS.



VESA local bus, easily upgradable to PCI: The VESA advantage now. Plus the option to change to PCI quickly and cost-effectively later.

• **Enhanced I/O:** Local bus graphics accelerator gives you an extra edge of speed for graphics apps! • Local bus IDE controller makes disk read/writes happen fast! • Buffered serial ports improve modem performance under Windows!

Toll-free IBM technical support: Call on the experts any hour, any day. Including Sundays! (Try calling Gateway 2000™ support on Sunday, and you'll find nobody home.)

• **Also available:** DX2 66 MHz AMBRA I/VL models that outperform the competition!⁴

	AMBRA 466I/VL	Gateway DX2/66V	De'l Dimension XPS DX2/66
WINSTONES	61.1	43.4	53.3
DOSMark	768.2	590.7	730.2
Graphics WinMarks	14.6	2.7	11.5

\$2,529

(Shown with optional 2X CD-ROM; add \$199.)

1-800-200-3197

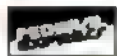
AMBRA

1-800-200-3197

In Canada, 1-800-363-0066, Ext. 3197



Weekdays 8am to 11pm
Weekends 10am to 7pm (ET)



DP60/PCI

- ✓ Pentium processor, 60 MHz
- ✓ 256KB L2 cache
- ✓ 8MB RAM, max: 128MB
- ✓ 4 ISA, 2 PCI, 1 ISA/PCI slot
- ✓ 440MB (12ms) IDE hard disk
- ✓ 6 drive bays
- ✓ Fast PCI IDE controller
- ✓ PCI graphics accelerator, 2MB
- ✓ 14" SVGA color monitor, LR
- ✓ 3.5" 1.44MB diskette drive
- ✓ Lexmark PS/2-style 101-key keyboard
- ✓ MS-DOS 6.2, Windows 3.1, mouse

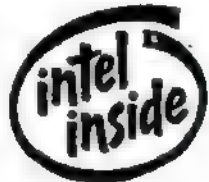
\$2,580 (With 540MB hard disk, add \$80. With 15" FST-NI monitor, add \$119.)

with PCI Diamond

Viper video

- ✓ 16MB RAM
- ✓ 540MB (12ms) IDE hard disk
- ✓ 2MB VRAM
- ✓ 15" FST-NI color monitor, LR

\$3,389



DP60E/VL (EISA/VESA)

- ✓ Pentium processor, 60 MHz
- ✓ 256KB L2 cache
- ✓ 16MB RAM
- ✓ 540MB SCSI hard disk
- ✓ 14" SVGA color monitor, LR
- ✓ VESA graphics accelerator, 2MB VRAM

\$3,779

Why AMBRA.

IBM TECHNICAL SUPPORT:
TOLL FREE, 24 HOURS,
7 DAYS A WEEK!

OPTIONAL
IBM ONSITE SERVICE:
ONLY \$29 FOR 1 YEAR!¹

CUSTOM CONFIGURATION
AT NO EXTRA SERVICE
COST!

30-DAY MONEY-BACK
GUARANTEE,
1-YEAR LIMITED
WARRANTY!²

GET A LOT OF EXTRA BANG FOR A FEW EXTRA BUCKS.



¹ Offerings may differ in Canada. ² \$29 for first year. Please call for further details. Onsite service may not be available in certain locations. ³ Please call for details regarding AMBRA's money-back guarantee and limited warranty. Return shipping and insurance are the responsibility of the customer. ⁴ Winbench 3.11.

PENTIUM AND PCI TECHNOLOGY. WITH ALL THE PLUSES.

AMBRA superior value on Pentium: Compare our Pentium processor-based desktop to a model from Gateway, point for point. At AMBRA, your money buys more!

Extra room for memory: Gateway uses up all 4 SIMM sockets (4 x 4MB). Our 2 free SIMM sockets (we use 2 x 8MB) let you easily expand.

101-key IBM keyboard: It's the classic IBM keyboard with all the qualities (especially the tactile feedback!) that PC users everywhere prefer.

	DP60/PCI	GATEWAY P5-60
MEMORY	16MB	16MB
SIMM SOCKETS FREE	2	0
HARD DISK DRIVE	540MB	540MB
DISK DRIVE INTERFACE	PCI IDE	PCI IDE
VIDEO ACCELERATOR	PCI	PCI
VIDEO RAM	2MB	2MB
MONITOR	15" FST	15" FST
KEYBOARD	IBM Lexmark	AnyKey®
CD-ROM	2X	2X
POWER SUPPLY	200 W	145 W
24-HR, 7-DAY SUPPORT	YES	NO
SERVICE PROVIDER	IBM	Dow Jones
PRICE (as of 3/7/94)	\$3,297	\$3,295

90 million WinMarks! if you like: Upgrade from our fast PCI accelerator to a superfast PCI Matrox MGA II+. It's a great option for graphics power users!

We just have to ask: Why would anyone put a 145-watt power supply on a Pentium technology system?

IBM onsite service: In case a problem arises, who would you like to see come through the door? A mere \$29 buys you a year of coverage from IBM.



\$3,297

1-800-200-3197

4 POUNDS. FIERCE COLOR. FULL-FUNCTION COMPUTING.

LIGHTWEIGHT SN-SERIES! SN425C

- ✓ 486SX, SL-Enhanced, 25 MHz
- ✓ 4MB RAM, max: 20MB
- ✓ 170MB removable hard disk
- ✓ 7.8" STN color screen
- ✓ 1 PCMCIA slot, Type II
- ✓ 86-key keyboard
- ✓ Integrated 16mm trackball
- ✓ Suspend/Resume
- ✓ MS-DOS, Windows 3.1
- ✓ Slip case
- ✓ 4 lbs., including battery

\$1,899

monochrome model

- ✓ 80MB removable hard disk
 - ✓ 8.2" monochrome LCD
- \$1,299** (With 170MB hard drive, add \$200.)

"ROAD WARRIOR": \$386

- ✓ PCMCIA 2.4/9.6 kbps data/fax modem, extra battery, battery charger, carrying case

"QUICK DOCK": \$404

- ✓ Port replicator, 14" SVGA color monitor, full-size keyboard

Free external diskette drive: A \$99 value with SN-Series purchase. Offer expires 5/31/94.

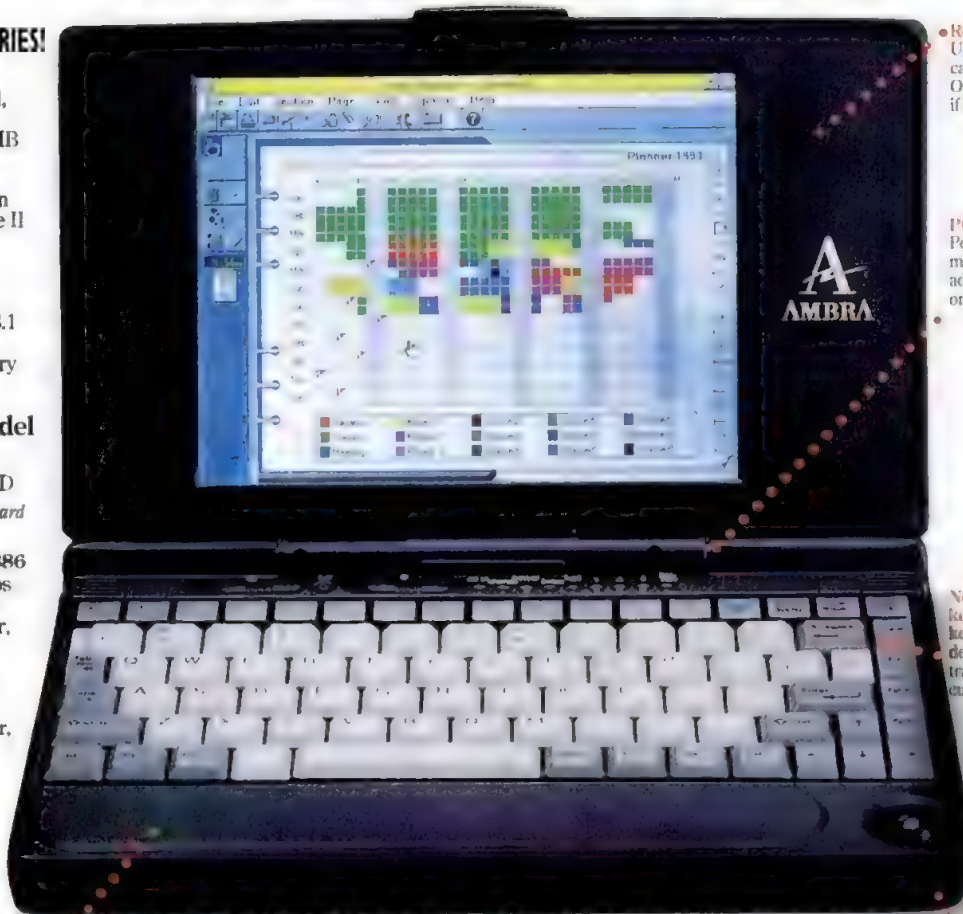
Ready to ship: We'll ship within 2 business days or the freight is on us.¹

Optional docking station: Instantly access computing resources (like networks) that require 16-bit expansion cards. Plug conveniently into peripherals!

• **Removable hard drives:** Upgrade storage capacity in the future. Or swap the hard disk if you share your SN.

• **PCMCIA slot, Type II:** Pop in a data/fax modem or network adapter to communicate on the spot.

• **No-compromise keyboard:** Standard key spacing and strike depth • Integrated 16mm trackball • Dedicated cursor control keys



FEATURE	AMBRA SN425C	COMPAQ Contura Aero
Price w/external diskette drive	\$1,899	\$2,358
Display	Color STN	Color STN
Processor	25 MHz SX	33 MHz SX
Hard Drive Removable/Upgradable	170MB Yes Yes	170MB No No
Keyboard	86 keys	76 keys
Docking station	Yes (optional)	No
7-day, 24-hr. support	IBM	Compaq

\$1,899

1 A 800 A 200 A 3197

BE PENNY WISE.

NOT

POUND FOOLISH.



AMBRA

1-800-200-3197

In Canada, 1-800-363-0066, Ext. 3197



**Weekdays 8 am to 11 pm
Weekends 10 am to 7 pm (ET)**



HIGH-POWER N-SERIES!



N450T

- ✓ 486DX2, 50 MHz
- ✓ 8MB RAM, max: 12MB
- ✓ 3.5" 1.44MB diskette drive
- ✓ 200MB hard disk
- ✓ 9.5" TFT active matrix color screen
- ✓ 1 PCMCIA slot, Type III
- ✓ 86-key keyboard
- ✓ Integrated 16mm trackball
- ✓ MS-DOS, Windows 3.1
- ✓ Carrying case
- ✓ 6.6 lbs, including battery

\$3,899

N450C

- ✓ 4MB RAM
- ✓ 9.5" DSTN color screen

\$2,599



N433C

- ✓ 486SX 33 MHz
- ✓ 120MB hard disk
- ✓ 9.5" DSTN color screen

\$2,199

"INSTANT OFFICE": \$927
✓ Docking station, 15" FST-
NI color monitor, full-size
keyboard

"TRAVELER": \$288
✓ PCMCIA 2.4/9.6 kbps
data/fax modem, extra
battery

Why AMBRA.

IBM TECHNICAL SUPPORT:
TOLL FREE, 24 HOURS,
7 DAYS A WEEK!

OPTIONAL EXECUTIVE
WARRANTY!¹

30-DAY MONEY-BACK
GUARANTEE,
1-YEAR LIMITED
WARRANTY!²

¹ Beginning the next business day; weekends and holidays not applicable. Subject to credit approval. Offer expires May 31, 1994.

² Offerings may differ in Canada. ³ Please call for details regarding Executive warranty. ⁴ Please call for details regarding AMBRA's money-back guarantee and limited warranty. Return shipping and insurance are the responsibility of the customer.

AMBRA

1-800-200-3197

In Canada: 1-800-363-0066, Ext. 3197



Weekdays 8 am to 11 pm
Weekends 10 am to 7 pm (ET)



CALL NOW!

MONEY AND SPACE SUPERSAVERS

S450DXA

- ✓ 486DX2, 50 MHz
- ✓ 128KB L2 cache, max: 256KB
- ✓ 4MB RAM
- ✓ 3 16-bit ISA slots
- ✓ 240MB (15ms) IDE hard disk
- ✓ 3 drive bays
- ✓ 32-bit IDE controller
- ✓ 32-bit graphics accelerator, 1MB
- ✓ 14" SVGA color monitor, LR

\$1,595

D466DXA

- ✓ 486DX2, 66 MHz
- ✓ 128KB L2 cache, max: 256KB
- ✓ 4MB RAM, max: 36MB
- ✓ 5 16-bit ISA slots
- ✓ 340MB (15ms) IDE hard disk
- ✓ 5 drive bays
- ✓ 32-bit IDE controller
- ✓ 32-bit graphics accelerator, 1MB
- ✓ 14" SVGA color monitor, LR

\$1,739 (Add \$50 for minitower.)

AMBRA DESKTOPS AND MINITOWERS FEATURE:

- ✓ Intel® Pentium™ upgradability
- ✓ 3.5" 1.44MB diskette drive
- ✓ Lexmark™ PS/2-style 101-key keyboard
- ✓ MS-DOS® 6.2, Windows™ 3.1, mouse

OPTIONS INCLUDE:

- ✓ 15" FST-NI color monitor: \$399
- ✓ 17" FST-NI color monitor: \$740
- ✓ 2.4/9.6 kbps data/fax modem: \$85
- ✓ 14.4 kbps data/fax modem: \$169
- ✓ 250MB tape backup unit: \$169

FAST AND UPGRADABLE I/VL SYSTEMS

D466I/VL

- ✓ 486DX2, 66 MHz
- ✓ 256KB WriteBack L2 cache
- ✓ 8MB RAM, max: 64MB
- ✓ 4 16-bit ISA, 1 32-bit VL bus slot
- ✓ Easy upgrade to PCI
- ✓ 440MB (12ms) IDE hard disk
- ✓ 5 drive bays
- ✓ Local bus IDE controller
- ✓ Local bus graphics accelerator, 1MB
- ✓ 15" FST-NI color monitor, LR

\$2,219

minitower

- ✓ 7 16-bit ISA, 1 32-bit VL bus slot
- ✓ 6 drive bays
- ✓ 2X Multisession CD-ROM

\$2,469

D4100I/VL

- ✓ 486DX4, 100 MHz
- ✓ 16KB L1 cache
- ✓ 256KB WriteBack L2 cache
- ✓ 8MB RAM, max: 64MB
- ✓ 4 16-bit ISA, 1 32-bit VL bus slot
- ✓ Easy upgrade to PCI
- ✓ 440MB (12ms) IDE hard disk
- ✓ 5 drive bays
- ✓ Local bus IDE controller
- ✓ Local bus graphics accelerator, 1MB
- ✓ 15" FST-NI color monitor, LR

\$2,529

minitower

- ✓ 540MB (12ms) IDE hard disk
- ✓ 7 16-bit ISA, 1 32-bit VL bus slot
- ✓ 6 drive bays
- ✓ 2X Multisession CD-ROM

\$2,859

PENTIUM/PCI TECH

DP60/PCI

- ✓ Pentium processor, 60 MHz
- ✓ 256KB L2 cache
- ✓ 8MB RAM, max: 128MB
- ✓ 4 ISA, 2 PCI, 1 ISA/PCI slot
- ✓ 440MB (12ms) IDE hard disk
- ✓ 6 drive bays
- ✓ Fast PCI IDE controller
- ✓ PCI graphics accelerator, 2MB
- ✓ 14" SVGA color monitor, LR

\$2,580

with Diamond Viper

- ✓ 16MB RAM
- ✓ 540MB (12ms) IDE hard disk
- ✓ PCI Diamond Viper graphics accelerator, 2MB VRAM
- ✓ 15" FST-NI color monitor, LR

\$3,389

LIGHTWEIGHT, HIGH-POWERED NOTEBOOKS

SN425C

- ✓ 486SX, SL-Enhanced, 25 MHz
- ✓ 4MB RAM, max: 20MB
- ✓ 170MB removable hard disk
- ✓ 7.8" STN color screen
- ✓ 1 PCMCIA slot, Type II
- ✓ 86-key keyboard
- ✓ Integrated 16mm trackball
- ✓ Suspend/Resume
- ✓ MS-DOS, Windows 3.1
- ✓ Slip case
- ✓ 4 lbs, including battery

\$1,899

N450T

- ✓ 486DX2, 50 MHz
- ✓ 8MB RAM, max: 12MB
- ✓ 3.5" 1.44MB diskette drive
- ✓ 200MB hard disk
- ✓ 9.5" TFT active matrix color screen
- ✓ 1 PCMCIA slot, Type III
- ✓ 86-key keyboard
- ✓ Integrated 16mm trackball
- ✓ MS-DOS, Windows 3.1
- ✓ Carrying case
- ✓ 6.6 lbs, including battery

\$3,899

SN "ROAD WARRIOR": \$386

- ✓ PCMCIA 2.4/9.6 kbps data/fax modem, extra battery, battery charger, carrying case

SN "QUICK DOCK": \$404

- ✓ Port replicator, 14" SVGA color monitor, full-size keyboard

N "INSTANT OFFICE": \$927

- ✓ Docking station, 15" FST-NI color monitor, full-size keyboard

N "TRAVELER": \$288

- ✓ PCMCIA 2.4/9.6 kbps data/fax modem, extra battery



1 A 800 A 200 A 3197

¹ Offerings may differ in Canada. ² \$29 for first year; desktops and towers. Please call for further details. Onsite service may not be available in certain locations. ³ Please call for details regarding Executive warranty. ⁴ Please call for details regarding AMBRA's money-back guarantee and limited warranty. Return shipping and insurance are the responsibility of the customer.
© 1994 AMBRA Computer Corporation. AMBRA is a trademark of ICPI Ltd. and used under license therefrom. The AMBRA logo and logotype are trademarks of AMBRA Computer Corporation. IBM and PS/2 are registered trademarks of International Business Machines Corporation. Intel is a registered trademark and Pentium is a trademark of Intel Corporation. Lexmark is a trademark of Lexmark International, Inc. MS-DOS is a registered trademark and Windows is a trademark of Microsoft Corporation. All other product names are trademarks or registered trademarks of their respective companies. Offerings, prices and products are subject to change without prior notice. Prices do not include shipping.

Why AMBRA.

IBM® TECHNICAL SUPPORT:
TOLL FREE, 24 HOURS,
7 DAYS A WEEK!

OPTIONAL
IBM ONSITE SERVICE:
ONLY \$29 FOR 1 YEAR!²

OPTIONAL EXECUTIVE
WARRANTY FOR
NOTEBOOKS¹

CUSTOM CONFIGURATION
AT NO EXTRA SERVICE
COST!

30-DAY MONEY-BACK
GUARANTEE,
1-YEAR LIMITED
WARRANTY!¹

These days faster is always better, but does more system

memory always lead to faster performance? Not necessarily.

After testing Windows 3.1, OS/2, and Windows NT, along

with some popular applications, we offer you a guide to the best memory value.

How Much Memory Do You Need?

By Rick Ayre

You know that how much memory you have in your computer can make a difference in how it performs. There is no question that you need more memory to run Windows or OS/2 than you ever did to run DOS. And some Windows applications need more memory than others. Some, such as Quattro Pro for Windows (winner of an Editors' Choice award), are snappy performers with 8MB of system memory but are downright sluggish with 4MB.

The question we're asking is simple enough: How much memory do you really need in your computer? Finding the answer, however, turns out to be no simple task.

When we ask how much memory you need, we're phrasing the question narrowly.

IN THIS REVIEW

Microsoft Windows 3.1.....	116
IBM OS/2 2.1 and OS/2 for Windows.....	132
Microsoft Windows NT 3.1	134
Highlights.....	116
How We Tested	117

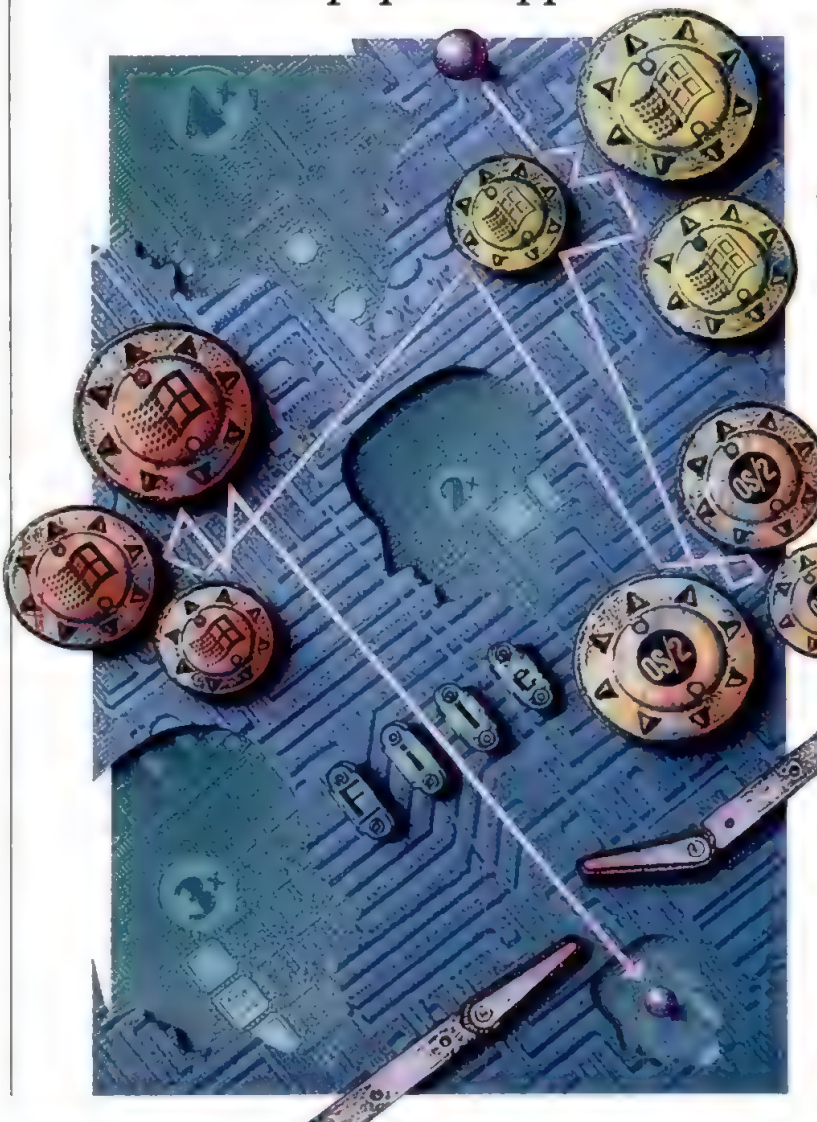


Illustration by Kevin O'Shea

HIGHLIGHTS

Looking for Memory Sweet Spots

WINDOWS 3.1 AND OS/2 both showed sweet spots at 8MB of system memory, and we suggest that as the minimum you use to run either. Given that Windows did run on our tests with only 4MB of memory, you could probably get by on that amount if you had to; but the operating system's performance would be sluggish. We recommend 16MB of system memory to run either operating system, because in the long run,

when you want to run OLE 2.0 or load large files, you'll want the kind of performance that 16MB can deliver.

WINDOWS NT is hungry for memory but scales well to the amount you install, so at least you'll get value for your investment. We suggest 16MB of memory as the minimum for satisfactory Windows NT performance; 32MB will buy you high performance.

We're not asking about video memory or disk cache memory or secondary processor cache memory; we're asking only about system memory, that memory into which you load your software—the operating system and the applications—so it can run.

Though computer memory is hardware, this is not a hardware issue. It is a software issue. The real question is, How much memory do you need to run the software you use?

To answer the question, we took a good look at how three popular operating systems, along with some of the popular applications that run under them, performed with differing amounts of memory. As we go to press, 1MB SIMMs (single in-line memory modules) can be purchased for \$45, 4MB SIMMs for \$160, and 16MB SIMMs for about \$900. Memory may not be as dear as it once was, but it still costs real money. And we believe you should only spend real money on things that return real value.

HITTING THE SWEET SPOT

One of the things we looked for was a memory sweet spot. Computer folklore says that operating system vendors—and application vendors too—tune their products to specific memory configurations. What they aim for is a memory sweet spot, an optimum amount of system memory above which performance improvements are minimal.

Though we'd heard a great deal of conjecture about sweet spots, we ran across real evidence during testing for our Perfect PC '93 story (*PC Magazine*, July 1993). We reported there that 8MB of system memory was faster than 4MB but that things got only marginally faster when the system memory was increased to 16MB. It therefore appeared as if Windows had a memory sweet spot.

This time, we set out to discover the optimum memory size for Microsoft Windows 3.1 (with MS-DOS 6.2), OS/2 2.1 (and, where it made sense, OS/2 for

Windows), and Microsoft Windows NT 3.1. What we discovered is good news for most PC users. There does indeed appear to be a memory sweet spot, at least for two of the three operating systems that we tested; you don't need to feed your operating system a steady diet of costly memory, because more is not always better.

WHAT WILL CHANGE?

Everything. And quickly. The landscape of computer resources is constantly changing. New versions of operating systems will soon be released, applications will undergo adjustments, and, ultimately, system memory demands will change as well.

Right now, the cutting edge for most people—the work that requires the most in terms of computer resources—is OLE 2.0 and the resulting application integration. For some others, it is graphics work involving images in large files. Soon it will be multimedia, including real-time video.

It's therefore unlikely that we'll turn a corner any time in the near future and find software vendors writing smaller programs with fewer features. As users demand more feature-rich applications, the demand for system memory will only increase.



Microsoft Windows 3.1: Sweet Spot at 8

Even though Microsoft Windows 3.1 is becoming the predominant operating environment for so many users, it's clear that there's no one set pattern for the way people use it. Everyone has a different set of applications and different styles of use, and these factors affect the amount of memory that's needed. To determine how much memory you need, you should first think about how you use Windows 3.1, and then match your memory requirements to your specific usage patterns.

Most people use Windows 3.1 primar-

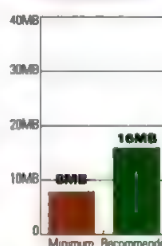
ily for running business applications. And while some users may load multiple applications simultaneously, most generally work in only one application at a time, in part because Windows 3.1 does not support advanced multitasking.

We tested Windows 3.1 by running some popular individual applications, in addition to Winstone 94, a benchmark test that will be familiar to readers of our comparative reviews of PC systems.

Winstone 94 is based on the 12 top-selling business applications for Windows and uses scripts based on profiles of how people actually use those applications. Winstone 94 executes scripts in these applications, one at a time, and then computes a final system score based

PC MAGAZINE
MEMORY GUIDE

Windows



Our Contributors: RICK AYRE is an executive editor of *PC Magazine*. Testing was done by DAN SMITH, a technical analyst at PC Magazine Labs.



Performance Tests: Memory

on the time required to complete each task, weighted according to each application's market share. This benchmark test was developed by the Ziff-Davis Benchmark Operation, in cooperation with PC Magazine Labs and others, and includes word processing, spreadsheet, database, business graphics, desktop publishing, and integrated software.

Our results were fairly dramatic. Our test machine, a 486DX/33 Compaq Deskpro/M with 4MB of memory, turned in a Winstone score of 16.7. That's significantly higher than our Winstone reference score of 10, which was achieved by a 386DX/25 Compaq Deskpro/M with 4MB of RAM, but it's not as big an increase as one might expect. That's because an inadequate amount of system memory serves as a performance bottleneck. In Windows 3.1, as in the other environments we tested, when applications don't fit entirely into memory, the system will typically use *virtual memory* by swapping part of the contents of memory to the hard disk. Performance suffers with virtual memory, because hard disk access is much slower than memory access.

SWEET SPOT SPOTTED

When we increased system memory to 8MB, the Winstone score jumped dramatically to 23.7 from 16.7—that is, the system handled applications about one-third faster with 8MB than it did with 4MB. And that's the kind of performance improvement you'd get by going from a 386 to a 486. Note, however, that performance does not necessarily continue to increase as you add more memory. When we increased memory to 12MB, we saw only a small increase in the Winstone score—to 24.3. Beyond that, the Winstone score leveled off.

Our tests of individual applications generally showed similar results. Tests performed on Windows applications such as Superbase and CorelDRAW showed that there was a significant performance jump from 4MB to 8MB, a smaller one from 8MB to 12MB, and only minor fluctuations after that.

There is, however, a big difference when you start working with very large files, as is often the case in graphics and desktop publishing applications, such as Adobe Photoshop, Aldus PageMaker,

Our performance tests showed that while more memory doesn't always mean better performance, you'll probably want more than the minimum that operating system vendors specify.

How We Tested

Our test-bed included a 486DX/33 Compaq Deskpro/M with a 340MB hard disk and a Matrox MGA Ultima video board using 2MB of video memory. The Compaq was configured with 4MB, 8MB, 12MB, 16MB, 20MB, 24MB, 28MB, and 32MB of system memory for each set of tests (with the exception of tests running Windows NT; this operating system cannot run with less than 12MB of system memory). The system's components were configured to fit the profile of a midrange machine.

WINSTONE

We relied heavily on applications-based testing. We started testing Windows 3.1 with our system-level Winstone test. Winstone 94, Version 1.0, was developed jointly by PC Magazine Labs, the Ziff-Davis Benchmark Operation, and others. A system's Winstone score is based on the time it takes to execute a series of application scripts for the 12 most popular Windows applications.

More specifically, the score is computed from the times required to run the scripts, weighted according to the market share of the 12 applications. The score is normalized against a reference machine—a 386DX/25 Compaq Deskpro/M with 4MB of RAM, whose Winstone score is 10. Since higher scores represent better performance, a score of 20 would mean that the tested system delivered twice the performance of the reference machine.

We also tested disk access under Windows NT using our Portable Code benchmark tests. These synthetic test suites, developed jointly by

CorelDRAW, and QuarkXPress. Such programs often generate larger files than word processors or spreadsheets do; and because of the way the graphics are manipulated by the computer, more of the file—sometimes the whole thing—needs to be in memory at the same time. So if you don't have enough memory, you may spend a great deal of time waiting for your screen to paint a fresh image.

We loaded a 12.5MB CorelDRAW

the UK Edition of *PC Magazine* and by PC Magazine Labs, use true 32-bit code and are based on profiles used to develop PC Bench 8.0. The results, too, are similar to those rendered by PC Bench 8.0: A system receives a disk access score, processor score, and video score. We reported only disk access scores for this story; since these scores represent throughput, higher scores reflect better performance.

SCRIPTED APPLICATIONS

Our scripted application tests used DOS and Windows business applications. We used test scripts—similar to those used in Winstone—to run the DOS versions of Lotus 1-2-3 3.4 and Paradox 4.5, as well as the Windows-based CorelDRAW 3.0, Excel 3.0, and Superbase 2.0. Using these scripts, we timed the execution of the applications. The results are measured in seconds, so lower scores represent better performance.

To tax these operating systems and applications further, we extended our applications tests in two ways. First, we loaded and ran a print preview of a moderately large (12.5MB) image file in CorelDRAW 4.0. Second, we performed OLE 2.0 tests. These included loading a large, complex document in Microsoft Word for Windows 6.0, activating the OLE 2.0 connections to both Excel 5.0 and Visio 2.0, and using the tools those connections made possible inside of Word 6.0.

We tested OS/2 2.1 with DOS and Windows applications, but we also tested it with native OS/2 applications. And we had those applications do things that OS/2 was designed to do well. We used Lotus SmartSuite 1.0, which includes Ami Pro, Freelance, and Lotus 1-2-3.

file and tried to do a print preview (the computer shows you on the screen how the file will look when it is printed). These tasks made the memory demands of a large graphics file apparent. Loading the file took 181 seconds with 4MB of memory but 146 seconds with 8MB. The print preview essentially didn't work at all when we had only 4MB of RAM; we stopped waiting after 12 hours. But the preview worked fine with 8MB, and it

YOUR NEXT COMPUTER IF YOU CAN'T FIND



Compaq Contura Aero

Weighing in at a mere 3.5 lbs., the **\$1,399** Contura® Aero is *Or \$50 per month** the perfect traveling companion. Though lightweight, it's packed with features, including a 486 processor that can run a range of applications with ease, as well as an integrated Compaq trackball that allows for comfortable use on the road.

Aero™ Features:

Only 3.5 lbs.
and 7.5" x 10.25" x 1.5"
♦
25MHz 486SX, 4MB RAM
♦
84MB Hard Drive
(170MB available)
♦
8" Monochrome Backlit VGA Display
♦
Integrated Compaq EasyPoint™ Trackball
♦
PCMCIA Type II slot
♦
NiMH Battery & AC Adapter
♦
Preinstalled MS-DOS® 6.2,
MS-Windows™ 3.1, and TabWorks®
♦
CALL FOR AVAILABILITY.



Compaq Contura

Monochrome **Color**
\$1,799 **\$2,099**
*Or \$64 per month** *Or \$75 per month**

An affordable notebook with the power and expandability for demanding business applications, and support for communications options. Power management features extend battery life, and security features protect data.

Contura Features:

25MHz 486SL(DX), 4MB RAM
♦
120MB Hard Drive
(209MB available)
♦
3.5" Diskette Drive
♦
9.5" Monochrome VGA or 9.5" Color
Advanced Passive VGA Display
♦
Compaq Trackball
♦
Battery & AC Adapter
♦
Only 6.2 lbs.
♦
Preinstalled MS-DOS 6.2,
MS-Windows 3.1, & TabWorks
♦
NEW LOW PRICE.



Compaq Concerto

The power of a desktop, the convenience of a notebook. Lets you work however and wherever you want—with a keyboard or a pen. Features Compaq MaxLight™ 9.5" Monochrome VGA backlit display, and power conservation features. **\$2,049**
*Or \$73 per month**

Concerto™ Features:

25MHz 486SL(DX), (33MHz available)
♦
4MB RAM
♦
120MB Hard Drive (250MB available)
♦
3.5" Diskette Drive
♦
Integrated High-Resolution Digitizer
with cordless, intelligent pen
♦
Local Bus Video
♦
2 PCMCIA Type II slots (or single Type III)
♦
Preinstalled MS-DOS 6.2, MS-Windows for
Pen Computing 1.0a, PenPower for
MS-Excel, InkWare NoteTaker, and TabWorks
♦
NEW LOW PRICE.



*Leasing is provided by GE Capital Services for a term of 36 months and is subject to approved credit and certain terms and conditions. Call for details. †Restrictions and exclusions apply. Monitors, battery packs and certain options are covered by a one-year warranty. © 1994 Compaq Computer Corporation. All rights reserved. Compaq and the Compaq Logo Registered U.S. Patent and Trademark Office. Contura is a registered trademark. Concerto, ProLinea, Aero, EasyPoint and MaxLight are trade marks, and Compaq DirectPlus and Solution Pak are service marks of Compaq Computer Corporation. Products, prices and programs are subject to change without notice. Other products are trademarks or registered trademarks of their respective companies. Microsoft and MS-DOS are registered trademarks, and Windows is a trademark of Microsoft Corporation. TabWorks is a registered trademark of Xerox Corporation. The Intel Inside Logo is a registered trademark and Pentium is a trademark of Intel Corporation. Offer available in the U.S. only.

**The
Compaq
3-Year
Warranty†**

MAY BE ON THIS PAGE. IT, CALL FOR HELP.



Compaq ProLinea MT

MT 4/33s MT 4/66
\$1,849 \$2,499
Or \$66 Or \$89
*per month** *per month**

Minitower case with EasyAccess side panel has five expansion slots and five drive bays for superior expandability. Just add options like a fax/modem, tape drive, or CD-ROM drive. Upgradable to Pentium™ technology.

ProLinea™ MT Features:

33MHz 486SX or 66MHz 486DX2
 (upgradable to Pentium Technology ZIF socket)
 *
 4MB RAM (upgradable to 64MB)
 *
 340MB Hard Drive
 *
 3.5" Diskette Drive
 *
 Local Bus Video with 1MB
 *
 14" SVGA Color Monitor (1024 x 768)
 *
 Preinstalled MS-DOS 6.2,
 MS-Windows 3.1, and TabWorks

**Preinstalled Multimedia
Solution Paq available.**



Compaq ProLinea 4/33s

Affordable, powerful, feature-rich,
 and ever popular. **\$1,625**
Or \$58
*per month**

Multimedia Solution Paq™

With SoundBlaster 16-sound board, internal dual-speed CD-ROM drive, external stereo speakers, microphone & multimedia software. Starts at \$499.

ProLinea 4/33s Features:

33MHz 486SX
 (upgradable to 486DX2/66)
 *
 4MB RAM (upgradable to 32MB)
 *
 240MB Hard Drive
 *
 3.5" Diskette Drive
 *
 Local Bus Video with 1MB
 *
 14" SVGA Color Monitor (1024 x 768)
 *
 Preinstalled MS-DOS 6.2,
 MS-Windows 3.1, and TabWorks

**Preinstalled Multimedia
Solution Paq available.**



Compaq ProLinea Net1/25s

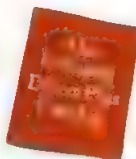
An ideal choice if you're looking for excellent performance at an affordable price. The all-in-one styling saves desktop space and makes set-up as simple as plugging the unit in. TabWorks, a Compaq exclusive, is preinstalled for greater ease of use. Network-ready and ideal for peer-to-peer communications.

\$1,249
Or \$45
*per month**

ProLinea Net1/25s Features:

25MHz 486SX
 (upgradable to 486DX2/66)
 *
 4MB RAM
 *
 100MB Hard Drive
 (200MB available)
 *
 3.5" Diskette Drive
 *
 Built-in 14" SVGA Color Monitor
 (1024 x 768)
 *
 Integrated Ethernet controller
 (Token Ring available)
 *
 Energy Star Compliant
 *
 Preinstalled MS-DOS 6.2, choice of
 MS-Windows 3.1 or MS-WFW 3.11

COMPAQ
DirectPlus



1-800-888-5569

Weekdays 7-7, Sat. 10-4 CST

Ask for our new free catalog.

actually took longer with 12MB or more.

DOS applications running under Windows 3.1 presented a somewhat different story. The performance of Lotus 1-2-3 didn't vary much with increasing amounts of system memory, because our worksheet fit into 4MB of memory. But Paradox showed significant performance differences, probably due to the amount of data that gets cached in system memory—which again, is more quickly accessed than the hard disk. Performance in Paradox improved dramatically when we increased system memory from 8MB to 12MB; but with 20MB or more, improvements were smaller.

OLE 2.0 MAKES DEMANDS

The situation gets more complicated when you are running multiple applications and using new application integration features, such as Object Linking and Embedding (OLE). OLE 2.0 really works, and more and more applications are gaining OLE features. We are moving into a document-centric world, a world where the document rather than the application is the focus of your work, and OLE 2.0 is an important step in that direction. Coincidentally, we believe the use of OLE 2.0, and other steps toward document-centric computing, will place increasing demands on system memory.

To test this, we brought up a document in Word that contained OLE 2.0 objects in the form of an Excel spreadsheet and a Visio drawing. With OLE 2.0, these objects look like part of the Word document, but when you click on them, you actually get the menus and functions—the tool set if you will—of the applications that created them. As a result, the document itself loads other applications, therefore using more memory.

The amount of system memory had an

extremely large impact on some OLE 2.0 functions. When we clicked on an embedded graphic, the system, when configured

load time leveled off at between 14 to 15 seconds. We saw similar results when we clicked on an Excel spreadsheet: With 4MB of memory, the load took more than 10 seconds; with 12MB or more, less than 6 seconds. The amount of memory made an even greater difference when we tried features such as dragging and dropping between applications. Again, the system was very slow with 4MB, significantly faster with 8MB, and even faster still with 12MB.

CONCLUSION

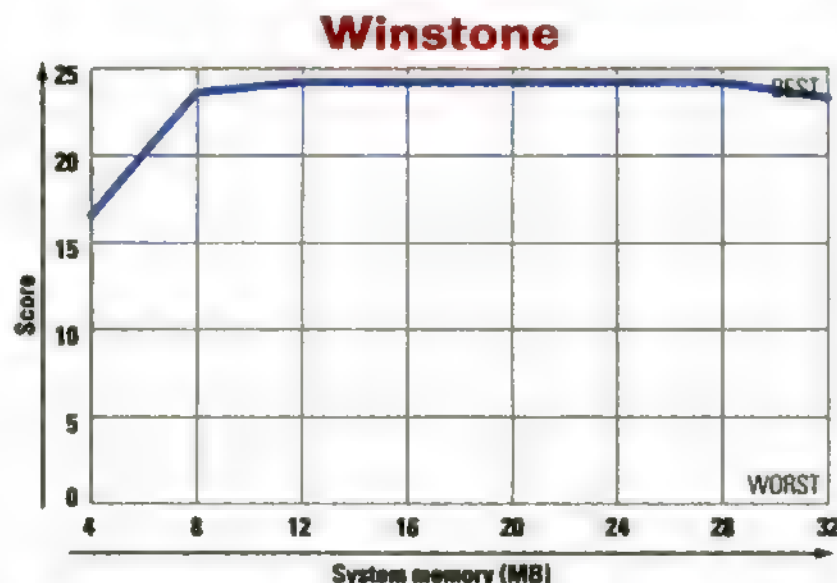
While these tests weren't exhaustive and didn't include everything that a Windows 3.1 user might do, they do represent a cross-section of common tasks.

Marketing campaigns are at least partly responsible for the confusion that surrounds memory. Operating system vendors are especially notorious for making a big issue of memory. After all, the objective is to sell software. As a result, vendors may recommend using less memory than is really optimal. As part of its marketing campaign, for instance, Microsoft recommends that you run Windows 3.1 with 4MB of system memory.

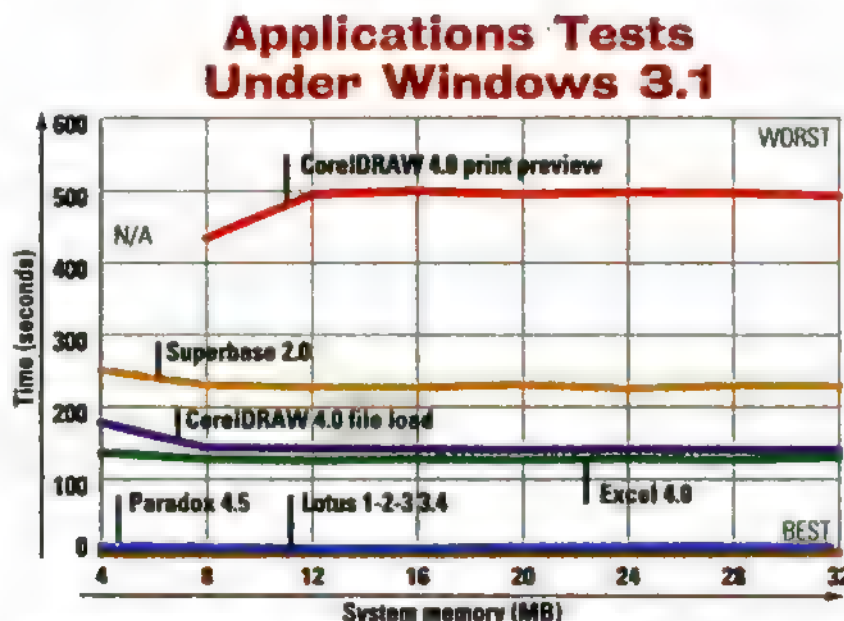
On the basis of our tests, we are convinced that 8MB—not 4MB—is the minimum amount of memory you'll need to run Windows 3.1 satisfactorily. With 12MB, you'll get optimal performance in many cases, but if you're buying a new machine, you should look at one with a more typical configuration of 16MB of RAM, which costs about \$300 to \$400 more than an 8MB configuration but may extend the life of your machine by allowing for high performance in the future, once you add new apps and desire increased application integration.

One thing that our tests cannot tell us is whether the effects of adding memory are the same for every processor. We know from earlier Winstone tests that, on a 66-MHz 486DX2, the Winstone score with 4MB was 15.8; with 8MB, 41.2; and with 12MB, 47.7. Beyond that, performance improved by only about 2 percent.

Does the memory sweet spot move up slightly as you move to a higher-speed processor. That is a distinct possibility. From 8MB to 12MB of system memory, there is a more significant performance increase on a 486/66 than on a 486/33. And it would make sense that the perfor-

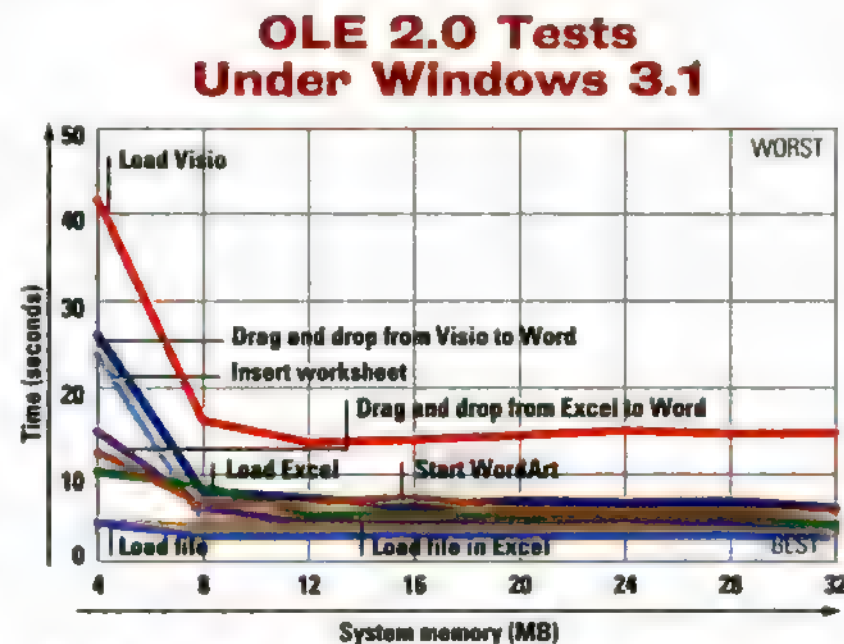


Winstone 94 showed a sweet spot at 8MB of system memory.



N/A—Not applicable: The task could not be completed in the 12 hours allotted.

Although applications did run under Windows with 4MB of system memory, they did not run well.



On our OLE tests, the most dramatic gains occurred when we increased system memory from 4MB to 8MB.

with 4MB of RAM, took about 42 seconds to load Visio; with 8MB of RAM, it took only 16.5 seconds. When we upped the memory to 12MB or more, the application

PC Buyer C'mon Down!



Get A Fortune Of Value

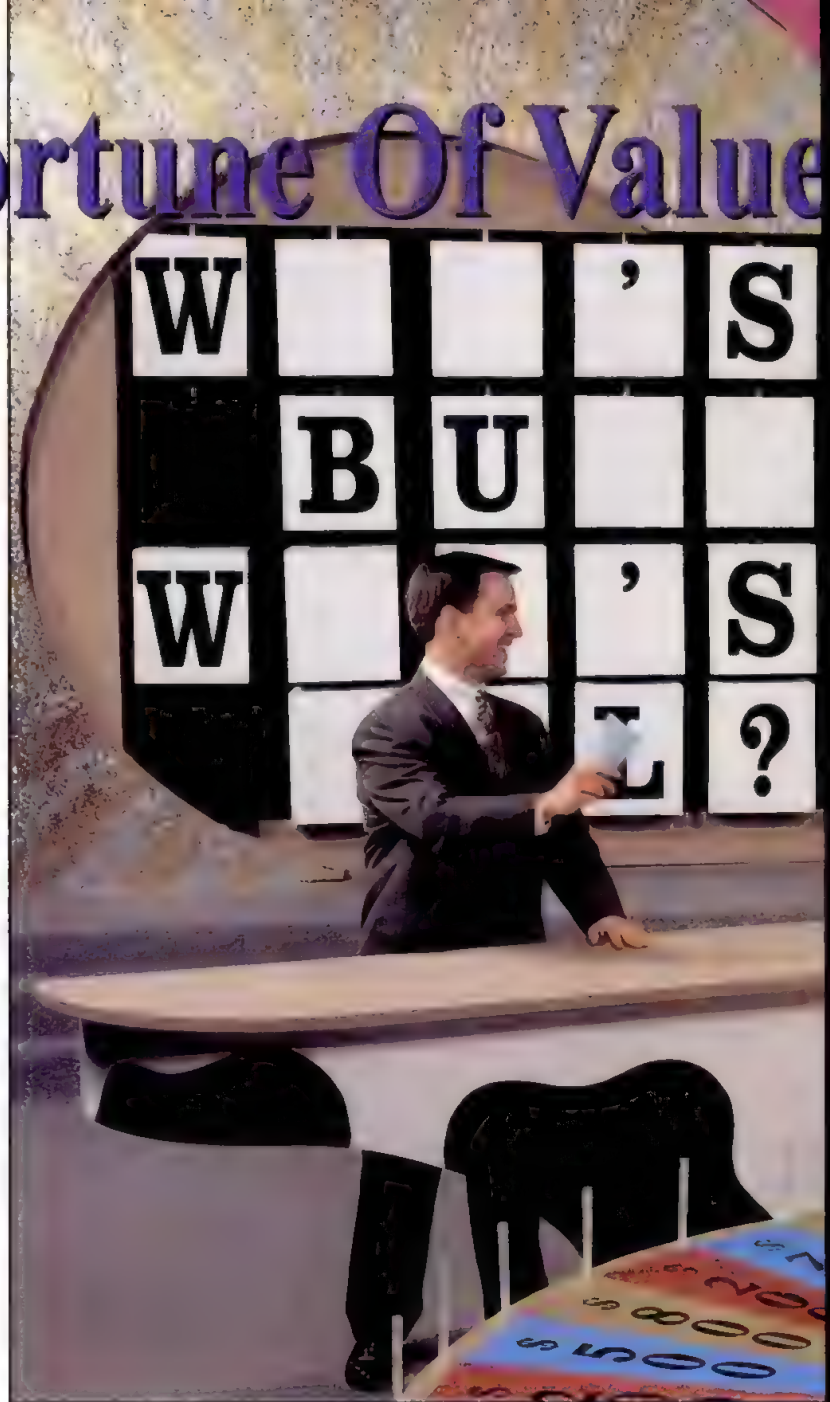
PC Buyers jump for joy! You're entering the exciting and competitive game of computer buying! We know you want to finish first with high-performance PCs and prize-winning service at the most affordable prices in the industry. It's no contest — with Gateway 2000™ you'll always be the winner!

And here are the stars of our show, Gateway's Pentium™-based systems! You'll get a shining performance with our new incredible **90MHz P5** system! And the stupendous performance of new lightening-fast hard drive systems! Screaming graphics controllers on the top two P5 models! Along with the most powerful Intel® processors available today! And (*drumroll please*) — all at 486 prices!

Intel's new **90MHz** processor gives our top-of-the-line, power-packed Pentium-based system the edge — it's one of the fastest PCs available today. And now in all Gateway 2000 P5 and 486 PCI systems, a new PCI/IDE controller allows the hard drive to transfer data up to twice as fast as non-PCI-based systems. The PCI/IDE controller enhances our Intel Pentium processor and PCI local bus for faster-than-ever data access!

Take full advantage of the performance-boosting PCI bus with high-end graphics controllers with 2MB VRAM on our top two P5 systems, for virtually unbeatable graphics! All other Gateway Pentium and 486 PCI-based systems come with a standard graphics with 1MB or 2MB graphics memory giving you up to 64,000 colors at 1024 x 768 resolutions.

Been spinning your wheels on how to get tomorrow's technology today and still pay 486 prices? With prices between \$2,495 and \$3,995, the puzzle is solved when you buy a Pentium-based system from Gateway 2000!



The Bonus Round

Win big with a 486 PCI system that blows the competition away! You'll get the pinnacle of 486 performance with Gateway's new **100MHz DX4** machine priced at \$2,495. The Gateway P4D-100 includes 8MB RAM, a 540MB hard drive, double-speed CD-ROM, 15-inch color CrystalScan® monitor, 128KB cache, 1MB PCI local bus graphics and your choice of application software. And you can upgrade all of our 486 systems to Pentium technology in the future. It's another sure winner from Gateway 2000!

With Gateway 2000!



The Home Version

Fun and games are only part of what you get with the Gateway DX2-66 Family PC,[™] our best-selling Family PC model priced at only \$1,995! All Family PC configurations include full multimedia capabilities and software choices for the whole family, bringing productivity, education *and* entertainment into your home.



8 0 0 - 8 4 6 - 2 0 6 3

"X" Marks The Spot

Looking for the perfect portable PC? You'll get a celebrity performance when you choose Gateway 2000™ for the most value-packed portable PCs in the industry!



Gateway has all the right answers for incredible values with the ColorBook! Performance-enhancing features ... fast 486 processors and an incredibly big 10.3-inch screen on two ColorBooks models! ... make the ColorBook an undisputed champion.

Introducing the **ColorBook DX4-75** with a faster-than-ever processor! The substantial power boost of the 75MHz processor has made this model the fastest 486 portable available today. And that's not all. For your extreme viewing pleasure, an extra-huge 10.3-inch dual-scan VGA color screen is standard on the DX2-50 and DX4-75 models. You won't find anyone else with a 10.3-inch screen at a better price.

All ColorBook models — 4SX-33, DX2-40, DX2-50 and DX4-75 — have a host of great features. At less than 5.7 pounds and measuring an ultra-thin 1.77 inches, the ColorBook supports simultaneous video; has an easy-to-use, built-in trackball; two PCMCIA Type II slots; great battery life; and a suspend/resume feature so you can stop work anytime and resume later without losing data or restarting the system.



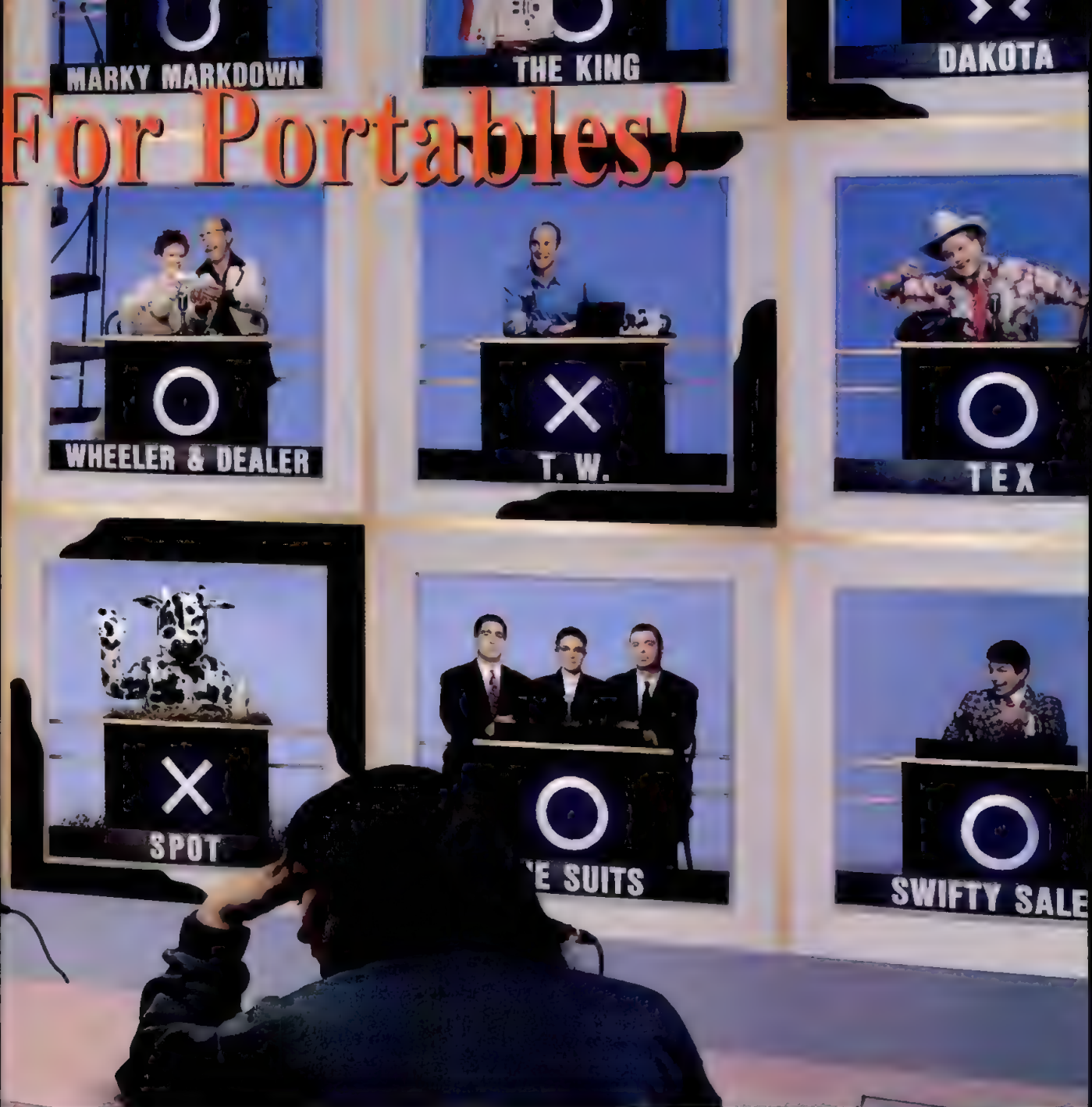
The revolutionary Gateway HandBook 486 is perfect for all your worldly travels. This powerful little performer will forever change the way you use a PC. And you won't have to think twice about taking it with you — no matter where you



go. It's a no-brainer. The HandBook is so small (*about the size of a day planner*) and so lightweight (*it's less than three pounds*) that you'll never want to be without it!

Unless you mind all the extra attention, as described by a leading columnist: "I almost got mobbed the other day on the train. I was doing what I usually do on the commute: writing on a notebook computer. The only difference was that I was using a Gateway 2000 HandBook 486 ... I can't wait until everyone has one. Then they'll leave mine alone."

For Portables!



The HandBook is a real PC with a powerful 486 processor; an IDE hard drive up to 130MB; standard 4MB or 8MB RAM upgradable to 20MB; a 7.9-inch bright, backlit VGA display screen; 78-key keyboard; EZ Point™ integrated pointer; excellent battery life; and suspend/resume feature.

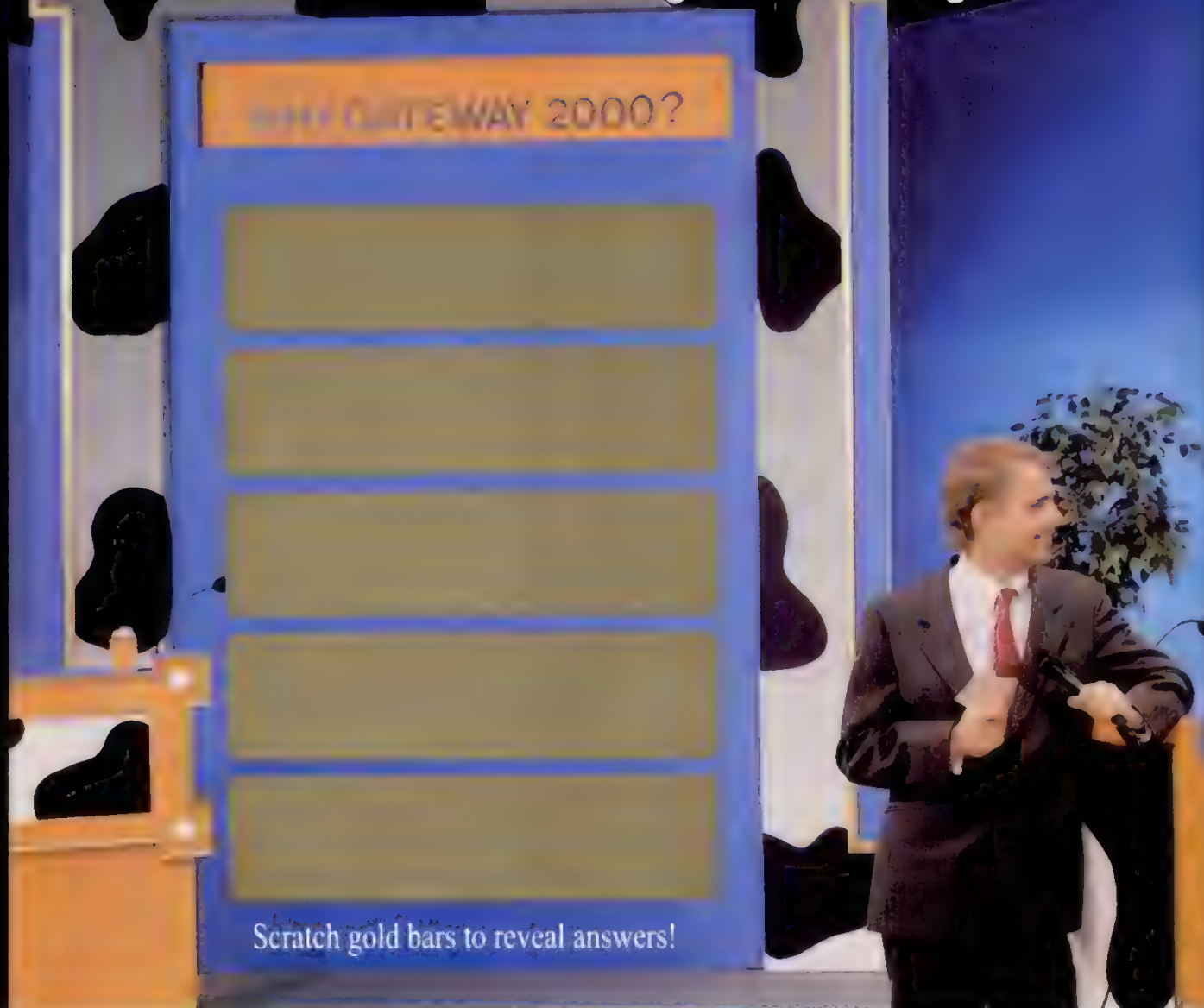


Looking for a square deal on the best portables around? The odds are stacked in your favor with Gateway's ColorBook and HandBook portable PCs.



8 0 0 - 8 4 6 - 2 0 6 3

The Surveys Say...



Gateway 2000™ is the name of the game when it comes to the best service and support. The Gateway family is made up of hard-working Midwesterners who are dedicated to satisfying our customers. And although we're a Fortune 500 company, we haven't forgotten our simple philosophy of providing an honest value, a superior product and the best service possible. In return, Gateway's loyal customers are always there to cheer us on. But you don't have to just take our word for it. The surveys prove it!

Hands Down Winner in Service and Reliability

A big thank you to readers of *PC Magazine* who responded to a Service and Reliability survey with impressive results: "In our latest survey, only Gateway 2000 gets our highest rating in both the desktop and laptop categories." The survey covered reliability, satisfaction with repair experience, satisfaction with technical support, and the likelihood of buying new PCs from the same vendor again.



All the talented people appearing in this ad are Gateway 2000 employees.

Extra Winnings

You'll score bonus points with the peripherals listed below, sold only with the purchase of a system. Call our special component add-ons division at 800-846-2080 for our complete line of extras for Gateway customers.

Multimedia

Multimedia Kit

Here's everything you need to add multimedia to a Gateway PC that has a CD-ROM drive:

- Gateway 2000™ 16-bit CD-quality sound card, compatible with Sound Blaster™ cards, with MIDI/game port, mic in, stereo line in/out
 - 2 Labtec® CS-180 speakers
 - Microsoft® Encarta Multimedia Encyclopedia
 - Corel Professional Photos CD Sampler
- \$132 (with system purchase)**

Get the multimedia kit with a CD-ROM for **\$299 (with system purchase)**.

Yamaha® YST-M10 Multimedia Speakers

The small speakers that sound big and come with a tiny price! This free-standing, self-powered speaker set is a great value!
\$75

Altec Lansing ACS-300 Multimedia Speakers

Get superior stereo sound with these top-rated Altec Lansing ACS-300 speakers with separate powered subwoofer. **\$219**

Communications & Storage

TelePath™ II Fax/Modem

Internal fax/modem, 14,400bps modem, V.32bis, with 14,400bps fax capability. Package includes data and fax communication software, plus a CompuServe® trial membership. **\$149**

Colorado Memory Systems® TBU

250MB internal automatic tape backup unit copies up to 9.5MB per minute. Comes with MS Windows™ and DOS® software, one tape and cable. **\$159**

Networking

Intel EtherExpress™

A 16-bit Ethernet adapter from a world leader in networking.
\$105 Twisted Pair or BNC

Ethernet Adapter from 3Com®

Manufactured by 3Com for Gateway.
\$105 Twisted Pair **\$125** BNC

Token Ring

IBM® 16-bit ISA Token Ring card. **\$429**

Monitors

CrystalScan® 17-Inch Monitor

Non-interlaced color monitor with intelligent multiscanning analog color display capable of ultra-high resolution up to 1280 x 1024 in non-interlaced mode and .26mm dot pitch.

Upgrade from a 14-inch monitor **\$430**

Upgrade from a 15-inch monitor **\$350**

(Prices good only for upgrades at the time of system purchase.)

Printers

Epson® Stylus 800 Ink Jet Printer

Great laser quality at an ever greater value. Measuring only 17 inches by 10.5 inches, the Stylus 800 has seven different typefaces and prints an extra-quiet 150 characters per second at 360dpi. Parallel cable included. **\$289**

Epson ActionLaser 1500 Laser Printer

The ActionLaser delivers professional-quality printouts. Fast six-page per minute speed, 14 resident fonts, 300 x 300dpi, and 1MB memory expandable to 5MB. Parallel cable included. **\$669**

Home Office Pack

Add these peripherals to your new Gateway desktop, and you have everything you need for an efficient home office.

■ Epson Stylus 800 Ink Jet Printer

■ TelePath II Fax/Modem

■ 1 Parallel Cable

\$399

mance bottleneck would shift with a processor-speed change. If what we speculate is true, the faster your processor, the more memory you'll want.

If you plan to do higher-end graphics

tasks, such as manipulating large true-color images or modeling in 3-D, or if you plan to edit large video files, you might want to look at configurations offering more RAM as well.

what environment an application was designed for. It isn't surprising therefore that most of the Windows 3.1 applications ran more quickly under Windows 3.1 than under OS/2 or Windows NT.

Although many people run Windows and DOS applications under OS/2, this operating system is really used to its fullest extent when running native multitasking applications. We don't have a scripted set of OS/2 applications, but we were able to test with Lotus SmartSuite 1.0 for OS/2, looking at Ami Pro and Freelance actions



IBM OS/2 2.1 and OS/2 for Windows:

Sweet Spot at 16?

Because OS/2 offers a very different set of capabilities than the combination of DOS and Windows, it uses system memory very differently. Most important, OS/2 is a true multitasking operating system, and this means it's much more likely that you'll actually have multiple applications loaded in memory when working in this operating environment.

OS/2 is capable of running both Windows and DOS applications, and we were able to run all of the applications that we tested under Windows 3.1 under OS/2 as well. We did encounter one major problem, however. The large graphic file that we tried to print preview in the Windows version of CorelDRAW never completed the test under OS/2, regardless of the amount of RAM in the system.

When we tested Windows and DOS applications under OS/2 2.1, we again noticed a big difference between the 4MB and 8MB configurations. Only the DOS version of Lotus 1-2-3 worked well with 4MB installed. The Windows versions of

Excel, Superbase, and CorelDRAW, as well as the DOS version of Paradox, performed sluggishly with 4MB of memory. With 8MB, however, all of these applications were much speedier: Excel and Paradox both completed their scripts in less than half the time. We saw an additional improvement with 12MB

of memory, but it was not nearly as dramatic.

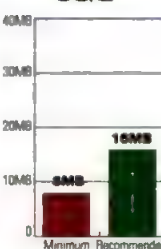
When running OLE-based Windows applications under OS/2 2.1 we saw the same pattern that we had seen under Windows 3.1 but to a greater extreme. Performance with 4MB was unacceptable. Performance picked up, however, when we increased the memory to 8MB, and it generally showed further improvement up through the 20MB configuration.

One thing that stood out during these tests was the performance variation between applications that were run under OS/2 2.1 (the full version, which includes IBM's variations of the Windows code) and those that were run under OS/2 for Windows (which installs on top of Windows 3.1). Windows applications ran dramatically faster under OS/2 2.1 than they did under OS/2 for Windows. And this was especially true in terms of file loads and OLE 2.0 tests.

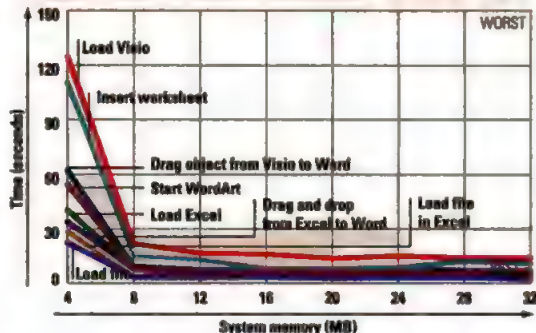
One thing to note is that application performance is at least somewhat dependent on

PC MAGAZINE MEMORY GUIDE

OS/2

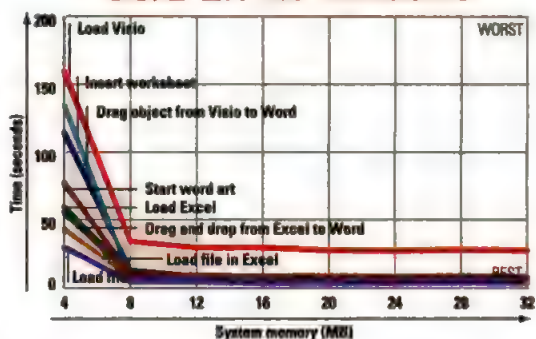


OLE 2.0 Tests Under OS/2 2.1



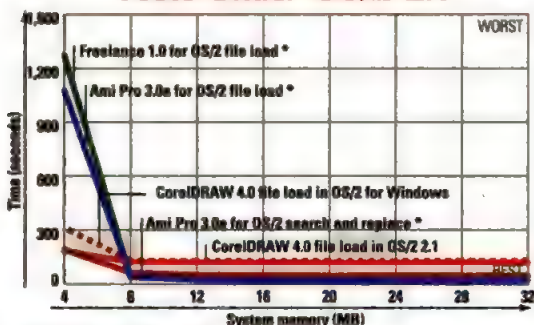
Performance under OS/2 2.1 was unacceptable with less than 8MB of system memory.

OLE 2.0 Tests Under OS/2 2.1 for Windows



OLE 2.0 test performance was slower under OS/2 for Windows than it was in IBM OS/2.

Lotus SmartSuite 1.0 Applications Tests Under OS/2 2.1



* Lotus 1-2-3 was recalculating in the background.

Performance with 8MB of system memory was dramatically better than with 4MB.

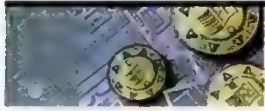
in the foreground while Lotus 1-2-3 recalculated in the background.

This last test produced perhaps the most notable performance differences as system memory was increased. The system was virtually unusable with only 4MB of memory: It took up to 20 minutes to load files. But performance improved (although it was still slow) with 8MB of RAM, was acceptable with 12MB, and was pretty good with 16MB.

CONCLUSIONS

IBM says that the minimum memory requirement for running OS/2 is 4MB, though it recommends 16MB. But our tests indicate that 8MB of RAM is the

minimum for acceptable performance. And if you really plan on using OS/2 to its fullest potential—which includes multitasking applications—we recommend a 16MB configuration, as IBM does.



Microsoft Windows NT 3.1: Hungry and Scalable

Microsoft Windows NT 3.1 offered a different testing challenge than Windows 3.1 or OS/2. Though it is a full 32-bit operating system that offers real multitasking, there are no native business applications to test it with. If you're using Windows NT now, you're probably still using your Windows- or DOS-based business applications, so we focused our testing on those.

DISK CACHE IS DYNAMIC

We first tried to get a handle on how native Windows NT applications (if they existed) might perform on our Portable-Code benchmark tests. The disk access tests (the only Portable-Code test suite whose results we reported) showed that Windows NT is both hungry for memory and scalable to the system memory you add. Windows NT uses a dynamic disk cache; that is, a cache that uses all available memory to achieve the best system

used to perform more quickly with the addition of more memory.

We show the disk access scores under OS/2 2.1 as a point of comparison, because the disk access tests use native OS/2 2.1 32-bit code. Unlike Windows NT OS/2 uses static disk cache. Note that we did not reconfigure the OS/2 disk cache as we added memory, and that performance scores under this operating system would probably have been higher if we had.

Windows NT is certainly capable of running DOS and Windows applications, and all of our tests were able to run with 12MB of memory—what Microsoft claims to be the minimum you need to run this operating system. As with Windows and OS/2, tests, the addition of a single 4MB chunk of memory in some instances improved performance dramatically. Under Windows NT, disk access performance jumped highest when we went from 12MB to 16MB.

Windows applications such as Excel and Superbase ran considerably better with 16MB. Loading the 12.5MB file in CorelDRAW was also much faster. And as with the other operating systems, there seemed to be a plateau—a point after which adding

memory made little difference. Under Windows NT, however, this leveling off generally occurred later and was more subtle.

OLE MAKES MORE DEMANDS

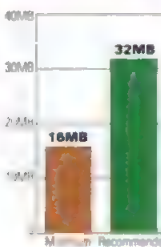
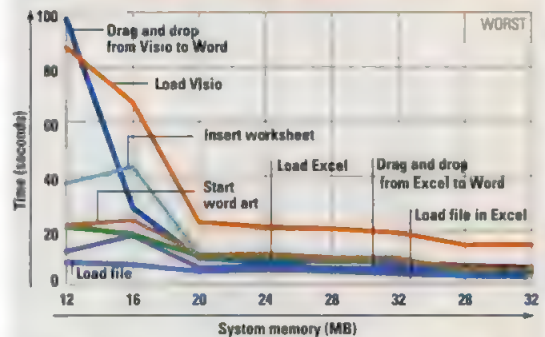
Under Windows NT, OLE 2.0 showed a voracious appetite for memory. With 12MB of memory, the entire OLE 2.0 test suite took slightly more than 295 seconds to complete. With 16MB of memory, it took slightly less time, but real performance improvement occurred at 20MB: The tasks were completed in about 80 seconds. And even at 32MB of memory, performance under Windows NT improved.

CONCLUSIONS

Windows NT does indeed run with 12MB of memory, as Microsoft claims. But you won't be happy with only 12MB of mem-

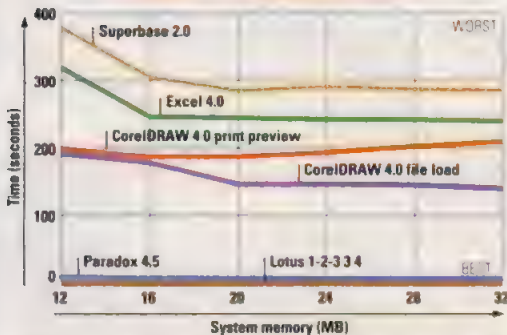
PC MAGAZINE
MEMORY GUIDE

Windows NT

OLE 2.0 Tests
Under Windows NT

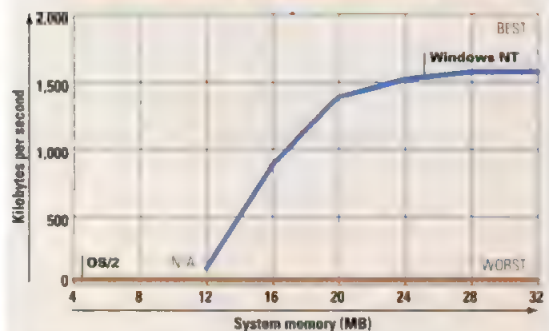
Under Windows NT, OLE 2.0 test performance improved as we added more memory.

ory, and we don't think you should fool yourself into thinking that you will. If you're going to run Windows NT, get at least 16MB of memory and consider buying a full 32MB of system memory. In the long run, it will serve you well. □

Applications Tests
Under Windows NT

Performance did not dramatically improve with more than 20MB of system memory.

performance. On our tests, performance improved markedly up through 28MB of memory. And while we tested only up to 32MB, Windows NT might have contin-

Disk Access Throughput in
OS/2 and Windows NT

N/A: Not applicable. Windows NT will not run with less than 12MB of system memory.

Disk access performance under Windows NT improved as more memory was added.

The new HP DeskJet 310 printer.

Desk



DESKTOP TO GO.

OFFICE

When scheduling a printer for the office, the most important factors to consider are print quality, reliability, and productivity. That's why the HP DeskJet 310 is the printer you need to get the job done.

CLIENTS

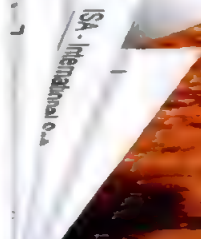
Businesses need a printer that can handle the demands of a busy office. The HP DeskJet 310 is the printer you need to get the job done. It's the printer that can handle the demands of a busy office.

HOTEL

A HP DeskJet 310 is the printer you need to get the job done. It's the printer that can handle the demands of a busy office. It's the printer that can handle the demands of a busy office.

HOME

For the home, the HP DeskJet 310 is the printer you need to get the job done. It's the printer that can handle the demands of a busy office. It's the printer that can handle the demands of a busy office.



optional.



Print high-quality black
& white or color wherever
you want to work.

Hewlett-Packard presents the DeskJet printer that doesn't require a desk. The HP DeskJet 310 is small and light enough to let you print anywhere. At the office, at home or on the road. And it gives you sharp, 300-dpi print quality, in black & white or color.

The HP DeskJet 310 costs only \$379*, yet it comes loaded with 84 typeface, size and style combinations, along with a new lightweight, multi-voltage power adapter. It prints portrait and landscape on plain paper, transparencies or labels, and it uses HP's own inkjet technology for clear, crisp output at up to three pages per minute.

If that's not enough for you, a whole family of optional accessories is available, including a color kit for just \$49, and a multi-page sheet feeder for easier desktop printing.

HP has managed to fit everything you could want into a little printer package. To see for yourself, look in the Yellow Pages, or call 1-800-552-8500, Ext. 7858 for the name of the HP dealer nearest you.

DeskJet Printers
Make it happen.



**HEWLETT®
PACKARD**

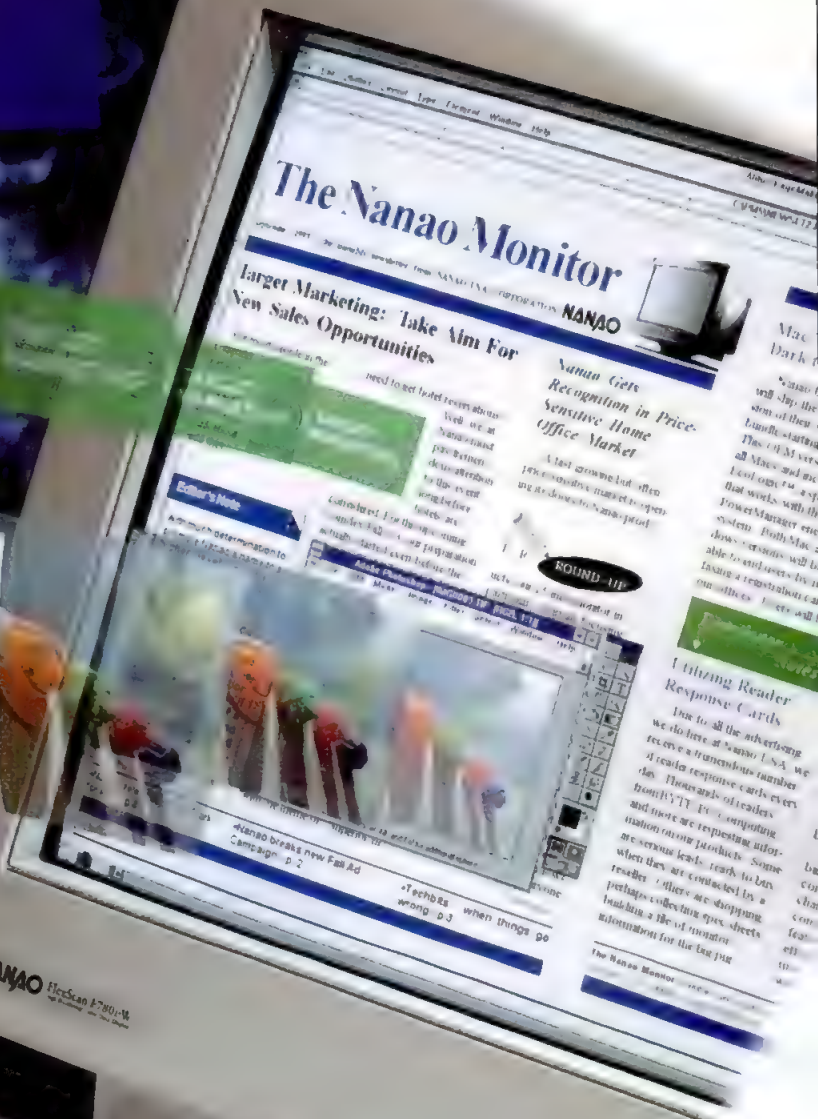
*Suggested U.S. list price. †In Canada call 1-800-387-3837, Ext. 7858. ©1993 Hewlett-Packard Company. PE12320

CIRCLE 116 ON READER SERVICE CARD

Before your graphics
can leap off the page, have
them leap off the screen.



TARGET
MARKETING



Characters have never been
sharper. Images have never been
crisper. Colors have never been more real.

And you've never seen a display monitor like

Nanao's new F780i-W. This is the first 21" monitor to

display true 1600 x 1200 resolution at 80Hz flicker-free refresh rate, maximized by a fine .26mm dot pitch, 45-100kHz horizontal frequency range and wide 200MHz bandwidth. With the F780i-W, small fonts and tiny lines are easy to see, even in the corners of the screen. And Nanao's WideView™ feature gives you a larger active display area so you can work in one- or two-page format. A Nanao version of Matrox MGA-II 64-bit Graphics Accelerator with 200MHz DAC and faster VRAM is also available as a special bundle to bring out the best in colors and images.

Everything you've ever wanted in a monitor is finally available today in one aesthetically pleasing, technically advanced solution. Call Nanao to ask about the new F780i-W or our entire family of award-winning monitors. And get ready for graphics that come to life on the screen. 1-800-800-5202

NANAO®

Superior In Every Detail

NANAO USA CORPORATION
23535 Telo Avenue, Torrance, CA 90505
(310) 325-5202 Fax: (310) 530-1679

3 Year Warranty

CIRCLE 283 ON READER SERVICE CARD

All product names are trademarks of their respective companies.
© 1994 Nanao USA Corporation.

CD RECORDERS

Roll Your Own CD

The hardware, software, and media for recording CDs are becoming more affordable. But the eight packages we tested aren't yet suited to casual users.

By Leon Erlanger

Desktop CD-recordable (CD-R) technology is bringing CD-ROM publishing to the masses. Just a few years ago producing CD-ROMs required the services of a commercial mastering and replication plant, with typical charges of \$1,500 to \$5,000 for the mastering process and a minimum run of 1,000 CDs at \$2 apiece. In 1989, Sony and Yamaha introduced the first desktop CD-recordable devices, but, with list prices close to \$30,000 and media that cost \$100 per



disk, creating a CD was still an expensive proposition.

The eight hardware/software CD recorder bundles that we review here are priced starting from as little as \$3,899 for Microboards' PlayWrite 1000 to \$9,995 for JVC's Personal RomMaker. And the price of CD-R media has come down to under \$20 per disk.

The cost of CD-R publishing overlaps with the cost of traditional replication at somewhere between 40 and 100 copies of a single mastered image, depending on the price you pay for CD-R media, the services you would require from a replication plant, and the value of your time. That, combined with CD-R's hefty storage capacity (as much as 650MB per disk), makes CD-R economical for distributing a lot of data to a limited number of users. Applications include distribution of corporate databases to branch offices or stores on a quarterly or monthly basis, limited runs of CD multimedia titles for beta testing, in-house corporate training applications, and prototypes of CD-ROMs slated for fabrication in a traditional mastering and replication plant. A less widely used but up-and-coming application of CD-R is archiving.

Only 7,500 CD-R drives were sold in the United States in 1993, according to Freeman Associates (Santa Barbara,

CA), and the infancy of the market shows. Painful installations, wide variations in interface design, and moderately buggy software were just a few of the problems we encountered.

Premastering packages like QuickTOPIX/Windows and Simpli-CD offer relatively intuitive Windows-style interfaces but may not give you the degree of control you need to premaster a fussy multimedia application. CD-Gen for DOS, on the other hand, impressed us with the fine degree of control it offers the sophisticated user, but its DOS-based interface was a confusing combination of menus, command lines, and function keys.

Installation in most cases was difficult. JVC's Personal Archiver won the prize for the fussiest installation, requiring two hard disks—one for the software and one to build the CD-R virtual image. CD-Gen for DOS requires the Philips CDD 521 recorder or any other drive it works with to have its own SCSI card, so if you have

other SCSI devices you'll need two controller cards.

REVIEW CRITERIA

Some CD recorders come with proprietary software; conversely, many premastering packages work only with certain CD-R drives. Thus we reviewed hardware/software bundles that included both the CD-R drive and compatible premastering software, whether the two came from the same manufacturer or not.

Of the eight bundles we received, one came from a hardware vendor (Pinnacle Micro),

five came from software vendors packaging their products with drives from Sony or Philips (CD-Rom Strategies, Meridian Data, Optical Media International, Philips LMS and Young Minds), and one came from JVC, a hardware and software vendor. The eighth package came from Microboards, a reseller that put together a Ricoh RS-9200 drive with CD Record software from Dataware Technologies to

► IN THIS REVIEW

<i>CD-Gen for DOS</i>	146
<i>JVC's Personal RomMaker</i>	146
<i>Personal Scribe 500 P</i>	148
<i>Pinnacle RCD-202</i>	150
<i>PlayWrite 1000</i>	155
<i>QuickTOPIX/Windows</i>	160
<i>Simpli-CD</i>	161
<i>WinOnCD</i>	162
Performance Tests	145
Montage: Indexing for Fast Access	148
Yamaha's Quad-Speed CDE100.....	150
Write-Once Archiving with CD-R...155	
Summary of Features.....	156

HIGHLIGHTS

CD Recorders

CD RECORDERS, which use special writable compact disks that any CD-ROM drive can read, are no longer prohibitively expensive. But that doesn't mean they're easy to operate: In testing these eight hardware/software CD recorder bundles, we found that the technology still has a way to go before it's convenient for the casual user.

CD-ROM PREMASTERING—producing samples of a disk for testing and debugging before committing to mass production—is the primary application for CD recorders today. Other applications include limited runs of CD multimedia titles for beta testing and distri-

bution of corporate databases to stores or branch offices. CD recorders are also useful for archiving, since the media isn't disturbed by magnetism, and the data, once written, can't be altered. Many of the premastering packages we tested provide rudimentary archiving capabilities, and dedicated archiving software is available as well.

SOFTWARE FEATURES are more important than hardware features when it comes to choosing a CD-R system: It is software that determines what encoding formats are supported and how much control you have over a disk's layout. The right hardware

will simplify the process: Look for fast recording speed (double or quadruple), the ability to daisy-chain multiple drives for simultaneous writes, and the availability of disk changers to automate the recording process.

FOR THE BEST RESULTS, plan to dedicate a PC exclusively to the CD recorder. Minor disruptions on the host system can ruin a recording session, so choose your configuration carefully. Especially important: a large, fast, SCSI hard disk—preferably one that uses embedded servo tracks to make thermal recalibration unnecessary.



form its PlayWrite 1000 kit.

Alea Systems' Personal Premastering package and disComposer, from Trace—both of which should be shipping by the time you read this—did not arrive in time for testing. The Philips CDD 521, Ricoh RS-9200, and Sony CDW-900E drives that we examined as part of the review packages are also available separately.

Aside from falling prices, the dominant trend in CD-R drives is increasing speed. Single- and double-speed recorders—which take about 70 and 35 minutes, respectively, to record 650MB of data—are likely to be supplanted by quadruple-speed and faster recorders as they become available. One quadruple-speed recorder, the Yamaha CDE100, was not shipping by our deadline; we examine it in the sidebar “Yamaha's CDE100 Drive.” As we finished testing, Eastman Kodak announced the imminent shipment of its sextuple-speed Kodak PCD Writer 600 and the Kodak Disc Transporter, a CD-R changer capable of holding up to 75 disks.

CD-R: THE MEDIA

Functionally, CD-R and CD-ROM media are identical. Slip a CD-R disk into almost any CD-ROM drive and the drive will treat it like a CD-ROM.

The physical structure of CD-ROM and CD-R media and the manufacturing process for each are slightly different, however. Similar to the process used to create vinyl records, CD-ROM manufacturing is a pressing operation that creates the media and molds in the data at the same time.

In CD-ROM manufacturing, first a microprocessor-controlled laser burns *pits* into a glass master. Sequences of these pits and intervening *lands*—the space between pits—encode the data on the disk.

A nickel master, created from the glass master, is then used as a stamp to mold CDs from molten plastic. After each plastic platter has been stamped and cooled, it

is coated with a layer of reflective aluminum and a protective layer of plastic.

CD-R media is manufactured in a similar fashion, except that instead of pits and lands, a long spiral groove is burned into the master with a focused laser. An organic dye is laid over the groove and covered by a thin layer of gold—which provides the necessary reflectivity and protects the dye underneath—and a layer of plastic. During the desktop recording process, the CD-R drive uses the heat from a focused

EDITORS' CHOICE

- *Basic premastering*..... **Simpli-CD**
- *Advanced premastering*..... **No Editors' Choice**

Young Minds' Simpli-CD stands out as the quickest, least frustrating way to begin premastering compact disks. The program, which sells for \$6,495 when bundled with the popular Philips CDD 521 double-speed drive, links directly to popular Windows file-management utilities. All you have to do is drag-and-drop the files you want onto a Simpli-CD “session window”; the software handles the rest.

Simpli-CD's shortcomings: It supports only basic encoding standards, and it lacks simulation and file-reordering capabilities. If you want any sort of control over the contents of your disk, you'll need to choose a different package.

HONORABLE MENTION

We are not awarding an Editors' Choice for advanced premastering because no package met all of our criteria: extensive simulation capabilities, support for a wide variety of recording formats, and detailed control over the positioning of data on the disk, all wrapped up beneath a usable interface. JVC's Personal Rom-Maker came closest—earning the package honorable mention—but its slow single-speed operation, high \$9,995 price, and unsophisticated software

interface didn't quite measure up to our exacting standards.

CD-ROM Strategies' CD-Gen for DOS also earns honorable mention for providing the most precise control over formatting and positioning of data. But CD-Gen's inconsistent interface, poor integration, and disorganized documentation make it frustrating to learn and use.

HARDWARE STANDOUT

Since we evaluated hardware and software as bundles, we aren't awarding an Editors' Choice to any particular CD-R drive. However, one drive does clearly stand out: the quadruple-speed Yamaha CDE100 (\$5,500), which we examine in a sidebar since it wasn't shipping by our review deadline. We're confident that the performance of the quadruple-speed Yamaha drives (different configurations are available) will set the standard for professional CD-ROM premastering.

laser to permanently deform the organic dye layer into the pits and lands that represent the data.

Kao, Kodak, Mitsui Toatsu, Philips, Ricoh, Sony, Taiyo Yuden, TDK, 3M, and Verbatim offer CD-R media in two capacities: A 63-minute disk that holds 550MB and a slightly more expensive 74-minute disk that holds 650MB.

HEFTY, DURABLE STORAGE

The lifetime of CD-R media is estimated to range from 10 to 100 years—comparable with traditional CD-ROM media, and substantially longer than magnetic media. Another advantage of CD-R is standardization; once you have created a CD in the standard ISO 9660 format, it can be read

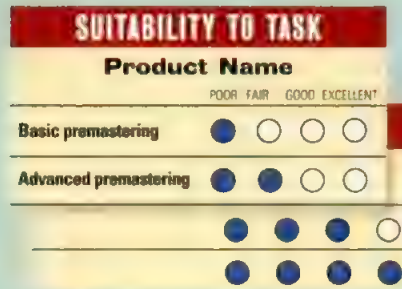
Our Contributors: LEON ERLANGER is an associate editor of *PC Magazine*, and ALFRED POOR is a contributing editor. JONATHAN HILL and JAMES KARNEY are frequent contributors to *PC Magazine*. MARGARET PIEMONTE is a technical analyst for PC Magazine Labs, and MICHAEL J. ZULICH is the PC Magazine Labs project leader who supervised the testing for this story.

Suitability to Task: CD Recorders

For our suitability-to-task ratings, we graded CD recorders on two dimensions: first, on their ability to create simple CD-ROM disks with a minimum of fuss; and second, on their ability to perform sophisticated premastering tasks, with support for a variety of data formats and detailed control over recording parameters. These characteristics are determined primarily by the software included in a package, although in some bundles with proprietary software the hardware influenced the overall score as well.

Few products excelled in both categories. Generally, the products that were user-friendly offered limited control over the format and positioning of data, while the products that did were clunky and difficult to learn.

Ratings for the **basic premastering** category were based primarily on ease of installation and operation when dealing with basic DOS and ISO 9660 recordings. Packages with point-and-click, graphically based interfaces were favored, as were those that proved resistant to operator error and hardware



inadequacies. The best software in this category also provided at least minimal simulation and file-reordering capabilities accessible through the same intuitive interface.

Ratings for the **advanced premastering** category were based on depth and breadth of features. Crucial elements were support for a variety of popular recording formats: Red Book digital audio, mixed-mode, CD-ROM XA, and Photo CD. Also important were simulation capabilities, the ability to reorder files and to close any "holes" that developed in the image, the presence of tools to examine and manipulate the CD image at a low level, and the ability to daisy-chain multiple recorders to record a number of disks simultaneously. Cross-platform support and the ability to write CDs on the fly were also considered a plus.

by a CD-ROM drive connected to any platform. This is not true of WORM or magneto-optical media, for which there are almost as many standards as there are products.

Furthermore, the popularity of CD-ROM readers has driven prices down to as low as \$200 for a double-speed unit (see "CD-ROM Drives: Going Mainstream," *PC Magazine*, February 22, 1994), which makes distribution of recorded CD-R media easy and inexpensive.

BURNING CD-Rs

To understand the CD-R creation process, it's important to understand two characteristics of the media. First, unlike hard disks, CD-R disks are read at a *constant linear velocity* (CLV): The drive keeps data moving over the laser beam at a constant rate by spinning the disk faster when it's reading from the inner portion of the disk, and slowing when it's reading from the outer regions. This results in an increase in random retrieval time as the system slows down the speed of rotation.

Combined with the slow throughput of

CD-ROM readers—150 kilobytes per second for single-speed drives, 300 KBps for double-speed, and correspondingly faster for the few available triple- and quadruple-speed drives—this characteristic makes it a challenge to create CD applications with adequate performance.

It's important to be able to control the physical location of files on a CD, so that frequently used files are placed nearer the center of the disk. Most of the packages here let you reorder files from the center of the disk toward its outer edge.

Second, the logical structure of both CD-R and CD-ROM media is characterized by the ISO (International Standards Organization) 9660 file format, a lowest-common-denominator standard created to ensure that files stored on a CD can be accessed across multiple platforms. Each platform (DOS, Macintosh, Unix, and so on) reads CDs using a special software utility. In the case of DOS, the utility is called MSCDEX, for Microsoft CD Extensions.

File-naming conventions of the ISO 9660 format are slightly different from the

naming conventions that MS-DOS users are used to. For example, ISO 9660 doesn't allow special characters like \$, !, @, or # and doesn't attach any significance to a period. And while DOS permits unlimited levels of subdirectories, ISO 9660 allows only eight.

A good premastering package will either alert you to directory structures and filenames that violate the ISO 9660 standard or automate the file renaming process. If ISO conformity is not important for your application, the software should allow you to retain DOS filenames and directory structures.

Other CD encoding standards include *CD-I* (CD-Interactive, a hardware and software standard for bringing interleaved text, sound, and video to home entertainment systems); *CD-ROM XA* (eXtended Architecture, a subset of CD-I that interleaves audio, video, and text); *Photo CD* (a standard introduced by Kodak for storing digitized photos on CD); and *Red Book* audio (for audio CDs). *Mixed-mode* disks combine Red Book audio tracks with computer-readable data.

Some newer CD-R drives offer both *incremental* and *multisession* recording. Incremental recording allows you to add data to a previously recorded disk, but until you close out the session by having the software generate a lead-out and table of contents, you won't be able to read the disk on anything except your CD-R drive.

Multisession capability lets you add data in separate sessions, each with its own lead-in, lead-out, and table of contents. No single multisession standard has yet achieved widespread acceptance. We expect that the Bridge extension to Kodak's Photo CD format will eventually become a standard, but until then, you'll want to make sure that your CD-ROM reader includes a driver for whichever multisession format your CD-R drive supports.

THE PREMASTERING PROCESS

The premastering process consists of building an image of the CD on your hard disk, including instructions on the location of each file; translating the image to ISO 9660 format; and writing the data to the CD. Most packages also have a feature that lets you simulate CD perfor-

SIX THINGS YOU CAN'T DO WITH YOUR DISK DRIVE.

(Unless You Have A SyQuest.)

1. Expand Your System



With Unlimited, Fast Access Storage.

2. Transport And Share Large Amounts Of Data.



3. Physically



Secure Sensitive Data.

4. Backup And Recover Up To Six Times Faster Than Tape.



5. Ensure Compatibility



With Most Service Bureaus.

6. Organize And Store Information Off-Line.



With sales of over 6 million cartridges and 1 million drives, SyQuest has become the world standard in removable mass storage. Our 3.5" 105MB and 270MB drives offer the capacity and performance of fixed drives with all the advantages of removability. And we back all our products with free support to protect your investment. To find out more



*Look for this
logo when buying
removable
storage products.*

things you can do with a SyQuest that
you can't do with other disk drives,
call us at 1-800-245-2278.



SyQuest

The World Standard.

FROM NOW ON, THESE ARE THE QUESTIONS YOU'LL BE ASKING BEFORE YOU BUY SOFTWARE.

1. Do your programs work together intuitively as if they were all one program?
2. Can you simply drag text, data and graphics from one program and drop them into another?
3. Is your software intelligent? For instance, can it handle everyday tasks automatically?
4. Are your programs recognized as the best in their category?
5. Do your menus, toolbars and other elements look alike and work in the same easy way?
6. Do your programs have no-charge product support? For how long?
7. Ultimately, is it worth getting software that doesn't do all these things?

Enter



You can find all the answers in one place.

You have a number of different jobs to accomplish. Every day. So your business software is key to putting together all the right answers.

Enter the new Microsoft® Office.

For the first time ever, individual programs work together like a single, insightful program.

What does that mean? You can concentrate on the task at hand. And forget about jumping around between programs.

This power to work like one program springs from our unique innovations. Take OfficeLinks. Built with the integration standard, OLE 2.0, it lets you drag a chart from your spreadsheet and drop it into your word processor. Then automatically convert everything into presentation slides. Or create custom letters from your database of clients with just a click. All as if you're using one program.

These programs even think the same. Their exclusive IntelliSense™ technology can sense what you need, then make everyday jobs like fixing typos happen automatically.

Together, they're so notably consistent in looks, actions and instincts, there's no question you'll

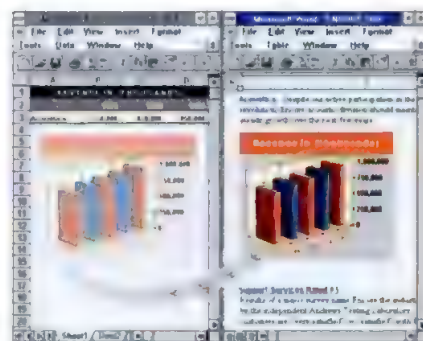
think of them as one program.

And only the Microsoft Office combines it all with unlimited no-charge support. Microsoft just won the ITAA Quality Award* for that support. A singular distinction.



Of course all this "oneness" could only come from the most acclaimed, technically proficient individual programs around—Word, Microsoft Excel, PowerPoint® and Microsoft Access®.

We've barely scratched the surface here of what it means for all your programs to work together like one. You'll want to read the reviews



yourself, talk to people who use it, scout around at your nearest reseller. And by all means, call us at (800) 894-6642, Dept. LB9, to find out more. Any questions?

Microsoft Office



The Microsoft Office Professional includes Microsoft Excel, Word, Microsoft Access, PowerPoint and a Mail workstation license.

(Upper right) Just click a button on the Microsoft Office Manager (MOM) toolbar and your choice of first-rate programs pops into action.

(Lower right) Need to move information between programs? Just drag and drop it from one place to another. Then edit right in place.

*Awarded in 1993 by the Information Technology Association of America. Microsoft Office Professional, shown here, includes Microsoft Excel, Word, the PowerPoint presentation graphics program, the Microsoft Access database management system and a workstation license for Microsoft Mail (server and software acquired separately). © 1994 Microsoft Corporation. All rights reserved. In the 50 United States, call (800) 894-6642, Dept. LB9. In Canada, call (800) 563-9048. Outside the U.S. and Canada, call your local Microsoft subsidiary or (206) 936-8661. Customers who are deaf or hard of hearing can reach Microsoft toll-free (TDD) services by calling (800) 892-5234 in the United States, or (905) 568-9641 in Canada. Microsoft, Microsoft Access and PowerPoint are registered trademarks and IntelliSense and the Windows logo are trademarks of Microsoft Corporation.

KILLER KITS.



Now Available: 15 Hot Titles • 180ms CD-ROM

• Triple Speed CD-ROM • New 3D Sound Card • 7 Day Toll Free Tech Support

Introducing an entire new line of kits that'll wipe out the competition. In fact, these kits have more multimedia than ever before.

More Value.

Now with four new affordable kits, the world of multimedia is open to everyone. Each of our new kits come with an award-winning sound card, a high speed drive, exciting CD-ROM titles and great technical support. Just consider the choices.

The **Pro Deluxe Multimedia Kit™** Triple Speed CD-ROM Drive • 16-Bit Stereo Sound Card with Award-Winning SRS 3-D Sound • 2 Powered Speakers • Microphone • 15 CD-ROM Titles Valued at \$1,300 • Sound Blaster™ Compatibility

The **Premium Deluxe Multimedia Kit™** Double Speed Reno™ Portable CD-ROM • 16-Bit Stereo Sound Card with Award-Winning SRS 3-D Sound • 2 Powered Speakers • Microphone and Headphones • Carrying Case • 15 CD-ROM Titles Valued at \$1,300 • Sound Blaster Compatibility

The **Super Deluxe Multimedia Kit™** Ultra-Fast Double Speed CD-ROM Drive

• Award-Winning 16-Bit Sound Card • 2 Powered Stereo Speakers • Microphone • 15 CD-ROM Titles Valued at \$1,300 • Sound Blaster Compatibility

The **Family Deluxe Multimedia Kit™** Ultra-Fast Double Speed CD-ROM Drive • Award-Winning 16-Bit Sound Card • 2 Stereo Speakers • 9 CD-ROM Titles Valued at \$950 • Sound Blaster Compatibility

More Hot Software And More Support From Media Vision.

Media Vision's new kits include an unprecedented number of CD-ROM titles. We're not talking yesterday's hits, but today's best sellers. From *Iron Helix™* to *Compton's Interactive Encyclopedia™* for Windows,™ we have the hottest titles around. Plus, with our easy installation video, set-up takes just minutes. As always, we offer FREE technical assistance 7-days a week. And, Media Vision also provides a 3-year warranty on sound cards and a 1-year warranty on CD-ROM drives.

For information or to find a dealer near you call:
1-800-845-5870.



MEDIA VISION

Now, that's multimedia!

© 1994 Media Vision, Inc., 47300 Bayside Parkway, Fremont, CA 94538. Media Vision, the Media Vision logo, Reno, Pro Deluxe Multimedia Kit, Premium Deluxe Multimedia Kit, Super Deluxe Multimedia Kit and Family Deluxe Multimedia Kit are all trademarks of Media Vision, Inc. Sound Blaster is a trademark of Creative Technology Ltd. All other trademarks and registered trademarks are the property of their respective holders.

CIRCLE 272 ON READER SERVICE CARD

Benchmark Tests: CD-R Premastering Kits

How We Tested

Our testing of CD-recordable drives focused more on software than on hardware, since the CD recorders we examined differed significantly only in their buffer sizes and whether they recorded at single or double speed. Our goal was to simulate real-world usage of the hardware/software bundles by creating a number of CD-recordable disks in different formats and with different mixes of files. We subjectively evaluated the ease of these operations and confirmed that the resulting disks were readable on a variety of commonly found CD-ROM drives.

On every drive, we created a basic ISO 9660-format disk containing a 453MB mix of executable, multimedia, and text files. On drives that supported mixed-mode recording, we also created a mixed-mode disk containing one Red Book digital audio track in addition to the 453MB of data. In each case we created the disk from an image file, with file-placement optimization turned on if the program supported it. (Programs that support file-placement optimiza-

tion look for executable, index, and other files that are likely to be accessed frequently and place them on the inner tracks.)

When appropriate, we created additional disks to test other features of the software, such as on-the-fly recording.

We did not conduct controlled quantitative performance tests because the time that a drive takes to record a disk depends only on its rated recording speed and the amount of data being

mance on the hard disk before actually writing data to the CD-R drive. While the accuracy of simulation varies among software packages, you can usually get an idea of whether files need to be rearranged for better performance.

Other useful features: The ability to delete files and subdirectories from a CD-R image after it is created and before it is written to disk; the ability to compress holes in the disk image created by the deletion of files; and the ability to transfer images spanning multiple partitions on a hard drive.

For archiving, the ability to transfer files to the CD on the fly—bypassing the image-building and simulation process—the ability to pick and choose directories and subdirectories for archiving, and incremental and multisession recording are clear advantages. At present, there aren't many archiving packages designed for CD-recordable drives. Two such programs, Meridian Data's NetScribe 1000 and JVC's Personal Archiver, are dis-

cussed in the sidebar entitled "Write-Once Archiving with CD-R."

HARDWARE CONSIDERATIONS

Most of the packages here will work on any 386-based machine. Typical memory requirements are 1MB for DOS-based software and 4MB to 8MB for Windows software. The hardware component essential to effective CD-R creation, however, is a large, fast hard disk. A capacity of 1GB to 1.5GB is recommended to hold both the ISO image that will be written to disk and the DOS-compatible files that you use to build that image. That won't leave room for much else, so you'll probably have to dedicate that hard disk—and possibly the entire system—to CD-R premastering. Some CD-R packages, like JVC's Personal RomMaker, come with a built-in hard disk.

A fast hard disk is required because of the nature of the CD-R recording process. CD recorders encode data in an interleaved format, such that each block of

written. A single-speed drive takes 74 minutes to write 680MB of data; a double-speed drive takes 37 minutes.

TEST ENVIRONMENT

We tested each CD-R drive on a 486DX2/66 EISA/VL-Bus system from Micron Computer. For these tests, the system was equipped with 8MB of RAM, a 256K external processor cache, a Diamond Viper VLB video adapter, and a 2.1GB Seagate Technology ST12400N SCSI-2 hard disk partitioned into four logical drives.

We used an Adaptec 2742-T EISA SCSI-2 controller in all tests to reduce the possibility of bottlenecks in the SCSI subsystem.

We tested the integrity of each CD-R disk we created using four different CD-ROM drives: a Micro Solutions backpack parallel-port drive, a Philips LMS CM215 drive, a Sony CDU7811-01 drive, and a Toshiba XM-3401E drive. To verify the presence of audio tracks on Mode 1 and mixed-mode disks, we installed a Creative Labs Sound Blaster 16 ASP card and Altec Lansing ACS-300 speakers.—*Analysis written by Margaret Piemonte*

data written to disk must be interleaved with its predecessor. Data is first written from the hard disk to a buffer on the CD-recordable drive, then to CD-R media. If there is any break in the flow of data to the buffer because of file fragmentation or a slow hard disk, the buffer is depleted—a condition known as *buffer underrun*. When this happens, the recording process stops: The CD-R disk is rendered unusable and you have to start all over again.

A hard disk that supports throughput of at least 1 megabyte per second is desirable. And the larger the buffer on the CD-recordable drive, the better.

Finally, aside from choosing a single, double, or, in the case of the Yamaha, a quadruple-speed CD-recordable drive, you should consider a drive like JVC's or Sony's, which let you daisy-chain several CD recorders together for simultaneous recording of a single image. This can speed up the recording process if you intend to distribute the same data to several users.

CD-ROM Strategies Inc.

CD-Gen for DOS

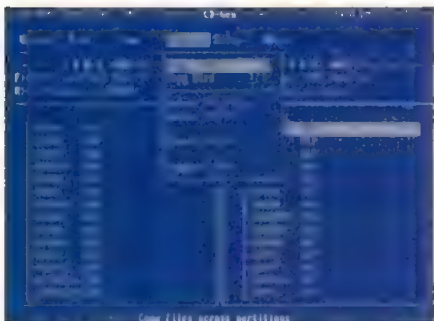
BY ALFRED POOR

CD-ROM Strategies' \$1,495 CD-Gen for DOS works with a variety of third-party CD recorders, including models from Kodak, Philips, Ricoh, and Sony. When we began testing, CD-ROM Strategies was selling its software together with a Philips CDD 521 double-speed recorder. By the time you read this, however, the company says it will no longer bundle CD recorders with its software, though you can still buy the drive with the software for \$6,745.

With CD-Gen, you can produce detailed profiles of CD images and maintain precise control over the format and positioning of data. You can reorder files, rename files that do not comply with the ISO 9660 standard, and compress holes in the disk image; you can even view and edit the image's contents byte by byte, Norton Utilities-style.

Professionals will appreciate CD-Gen's depth, but be forewarned: The software's unsophisticated interface and poorly organized documentation make it difficult to learn. The programs it consists of lack any coordination and do not even share an interface design: One has a Windows-like, but still character-based, interface; another is a DOS command line utility; the third uses function-key menus. (As we were writing this story, the company was developing a Windows-based version of CD-Gen.)

To premaster a CD-ROM disk, you



CD-Gen for DOS is actually a collection of programs, each with a different interface.

first use a split-screen DOS program vaguely reminiscent of the Windows File Manager to specify which files and directories to include. CD-Gen then stores this information in a "virtual CD volume"—a true image file—on your hard disk. You must decide in advance how big this volume needs to be.

You can edit the contents of the virtual volume, and you can maintain multiple virtual volumes on your hard disk if you have sufficient space. A simulation utility lets you verify that your application functions properly before you write the image

to the disk.

CD-Gen comes with a variety of utilities, including one that converts .WAV files to Red Book audio format. The software supports

multisession recording and can also record on the fly.

► **CD-Gen for DOS.** List price: With Philips CDD 521 drive, \$6,745. Requires: 386SX/25-based PC or better, 1MB RAM, DOS 5.0 or later. CD-ROM Strategies Inc., 6 Venture, #208, Irvine, CA 92718; 714-453-1702; fax, 714-453-1311.

Circle 473 on reader service card

JVC Information Products

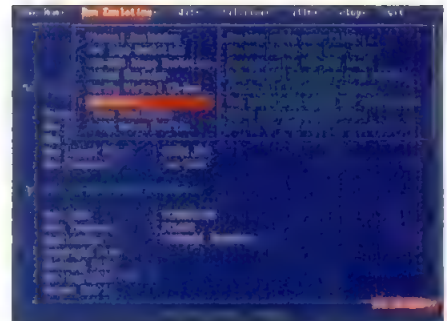
JVC's Personal RomMaker

BY JONATHAN HILL

JVC Information Products bundles its JVC XR-W1001 single-speed CD recorder and proprietary software into a \$9,995 package that it calls JVC's Personal RomMaker. Personal RomMaker is a robust, full-featured premastering system with the best simulation capabilities of any product we tested. The self-contained package is sold only through JVC dealers, usually at little or no discount off its list price.

The hardware component of Personal RomMaker includes an Adaptec 1510 SCSI card and a mini-tower enclosure that houses the CD recorder, a 1.2GB SCSI hard disk, and an expansion bay for an optional 4-mm DAT drive (\$1,804 more).

Personal RomMaker requires you to create a text file that contains a list of the files you want to include on your CD. Once you've completed this step, the



JVC's Personal RomMaker can acquire file-usage statistics during emulation.

package creates a virtual CD-ROM image that you can use to simulate the performance of your CD-ROM application on a number of popular CD-ROM readers. You can create a custom emulation to simulate performance for a reader that isn't coded into the software, too: Just connect the target reader and run a utility that measures its performance characteristics.

Personal RomMaker uses the simulation to collect file-use statistics that can help you decide how to organize files for optimal performance. You can, if you wish, even specify the exact physical block addresses of individual files on the CD.

When you are satisfied with your disk's layout, you create a true image file—this takes about an hour for a full disk—which you can write to the CD recorder, the DAT drive, or an 8-mm ExaByte tape drive.

Personal RomMaker supports virtually every CD-ROM formatting standard, including the new Sony Data Discman and MiniDisc Data formats.

Personal RomMaker's biggest short-

SUITABILITY TO TASK

JVC's Personal RomMaker

	POOR	FAIR	GOOD	EXCELLENT
Basic premastering	●	●	○	○
Advanced premastering	●	●	●	○

coming is its slow performance. To speed things up, you can buy a JVC MultiDrive version of the package (not tested), which comes in a taller tower that houses up to five drives. Up to 20 of these JVC MultiDrive units can be daisy-chained together for simultaneous writes. JVC has also announced double- and quadruple-speed versions of Personal Rom-

Don't Just Take Our Word For It.



"This Editors' Choice award-winning monitor is an excellent buy; very hard to pass up."

PC Magazine, March 15, 1994

"The extra-large display and on-screen controls make the Optiquest 4000DC a Best Buy."

PC World, April, 1994



Nice praise. Nice awards. We are flattered that the experts are finding out what Optiquest users worldwide have known all along: that high performance can be found in monitors without big price tags. For example, our 1500D won this year's

PC Magazine's Editors Choice Award for the second year in a row. And our 4000DC won PC World's Best Buy Award. In fact, the complete Optiquest line of fully non-interlaced, high quality energy-saving color monitors each start out with clarity and value built right in. Optiquest monitors are environmentally efficient, each fully compliant with all VESA®-DPMS™ and EPA Energy Star™ performance standards. However, buying a green monitor is just a start. To be truly green the monitor must be instructed to power itself down. For a limited time, to insure this, we'll include



OPTI-GREEN™
monitor and energy saving software

Opti-Green™ Software with the purchase of any Optiquest green monitor. Opti-Green™ Software will automatically shut any VESA®-DPMS™ compliant monitor down after a user defined period of time. It's just another way Optiquest provides the Complete Green Solution.

So read the reviews, compare the awards and prepare to save lots of money. Then check out Optiquest's completely non-interlaced, high quality green monitors and power-saving accessories for yourself. We're sure you'll be as impressed as the pros. For more information call 1-800-THE-OPTI.

OPTIQUEST®

CIRCLE 147 ON READER SERVICE CARD

COMDEX®
Booth M4346

© 1994, Optiquest, Inc. 20490 Business Parkway, Walnut, California 91789 USA • Tel: (909) 468-3750 • Fax: (909) 468-3770
The Energy Star emblem does not represent EPA endorsement of any product or service. All trademarks mentioned in this ad are the property of their respective companies.

Montage: Indexing for Fast Access

By Jonathan Hill

Most premastering packages let you archive data to a recordable CD to some extent. But finding the right data afterwards demands an efficient search-and-retrieval engine—something that none of the reviewed programs has. Montage, from Information Management Research, fills this gap by adding query-by-example, keyword, and Boolean full-text search capabilities to any CD premastering software.

Montage is a database system designed and tuned for use with CD-ROMs and other optical media; we examined Montage Personal, the single-user version. Montage writes its own retrieval engine, which requires only about 400K, along with index and control files, onto every CD. As a result, anyone with a CD-ROM drive can rapidly search and query the full text of a disk created using Montage—and there are no additional licensing fees for distributing the retrieval engine.

Montage's document-management facility lets you organize files into a

series of virtual folders and subfolders, grouped by subject matter. The retrieval engine takes advantage of these groupings to provide better performance than you can find in packages that merely walk through the original directory tree; typical queries take about 3 seconds.

You begin a Montage session by first opening or creating a "library," essentially a CD in progress, then defining a "profile template" that you later use to add descriptive information (like title, summary, keywords, file path, and so forth) to the archive. Next you tag, either individually or by using wildcards, the files to include; create "profile cards" for each file (or group of files); and then export the files to an intermediate database prior to creation of the CD. Montage relies on

your existing premastering software to actually create the disk; customized versions of the program work directly with each of the packages in this review.

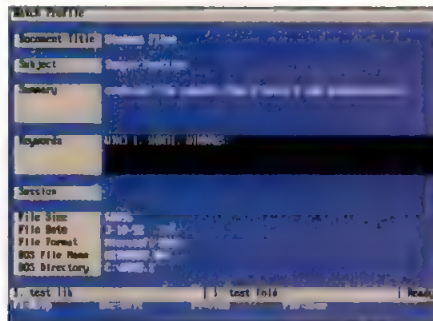
By the time you read this, Infor-

mation Management Research will be shipping a Windows version of Montage called Alchemy.□

► **Montage Personal.** List price: \$995. Requires: 386-based PC (486 recommended), 4MB RAM (8MB recommended), DOS 3.1 or later.

► **Montage Network.** List price: three users, \$2,995; each additional user, \$195. Requires: Any DOS-compatible network. Information Management Research Inc., 5660 Greenwood Plaza Blvd., #210, Englewood, CO 80111; 303-689-0022; fax, 303-689-0055.

Circle 481 on reader service card



Montage Personal's batch profiles make adding keyword and summary information to groups of related files easy and quick.

Maker, but pricing was not available at press time.

► **JVC's Personal RomMaker.** List price: \$9,995. Requires: 386-based PC or better, 2MB RAM, DOS 3.32 or later. JVC Information Products, 17811 Mitchell Ave., Irvine, CA 92714; 714-261-1292; fax, 714-261-9690.

Circle 474 on reader service card

Meridian Data Inc.

Personal Scribe 500 P

BY JAMES KARNEY

Meridian Data, a company known for its network CD-ROM solutions, offers Personal Scribe 500 P, a \$6,995 premastering package that combines the Philips CDD 521 double-speed drive, the company's own Personal Scribe software,

and an Adaptec 1542C host adapter. The software—which Meridian Data sells separately for \$995 to be used with such CD-recordable drives as the Kodak PCD Writer 200, JVC XR-W1001, Philips CDD 521, Pinnacle RCD-202, and Ricoh RS-9200—is about average in its capabilities and ease of use.

Meridian's Personal Scribe software has a DOS-based menu-driven interface that lets you specify which files to put on the CD. You can also, if you wish, run the program in a batch mode using command-line switches.

By default, the software takes a number of steps to reduce the possibility of buffer underrun. Personal Scribe can con-

trol the order in which it writes files to disk to optimize data-transfer rates; it will even add null sectors to the data stream, which keeps the drive busy writing useless information until the needed data has been fetched. Of course, if you don't want

to waste space on the target disk, or if the positioning of data is important, you'll want to turn this feature off.

Personal Scribe 500 P lets you manu-

ally reorder files, but since a simulation facility isn't provided you'll have to rely on your instincts. If you decide to change the order of files after you've created the image, you'll have to generate it again (the software can't close up holes in the disk image).

SUITABILITY TO TASK				
Personal Scribe 500 P				
	POOR	FAIR	GOOD	EXCELLENT
Basic premastering	●	●	●	○
Advanced premastering	●	●	○	○

NOW THE INFORMATION HIGHWAY HAS A PASSING LANE



SEVILLE STS

AND A DRIVING RANGE.

TEST DRIVE YOUR FREE "CADILLAC IMPRESSIONS" DISKETTE.

Now the showroom is as close as your PC. Preview Cadillac's innovative Northstar System.

Experience the 295-horsepower Seville STS, Eldorado Touring Coupe and other Cadillac models.

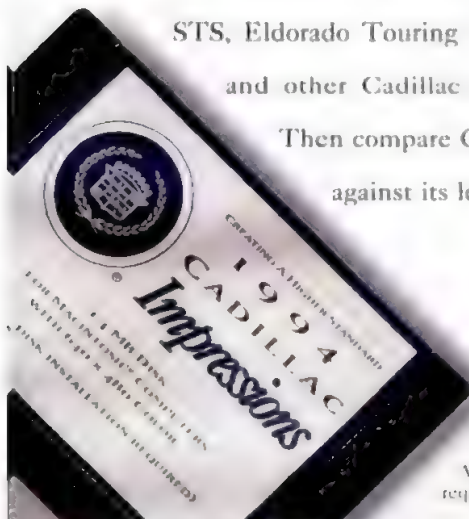
Then compare Cadillac against its leading competitors.



AND PLAY A ROUND WITH LEE

TREVINO. Your complimentary diskette also includes a challenging golf game. Team Cadillac member Lee Trevino is your host at the Doral Resort and Country Club's championship course: the famous Blue Monster. To order your "Cadillac Impressions" diskette at no charge to you,

call 1-800-333-4CAD.



CADILLAC
CREATING A HIGHER STANDARD

CIRCLE 173 ON READER SERVICE CARD

Available on DOS high-density 3.5-inch disk (VGA required) or Macintosh high-density 640 x 480 color.

Always wear safety belts, even with air bags.
©1994 GM Corp. All rights reserved.
CADILLAC® EL DORADO® NORTHSTAR® SEVILLE®





Personal Scribe 500 P can rename files that don't fit ISO 9660 naming conventions.

The software can create Red Book audio, CD-ROM XA, and mixed-mode CDs, and will optionally prompt you to change filenames that don't comply with ISO 9660 standards. Multisession recording is supported, too.

Personal Scribe 500 P comes with a number of low-level utility programs, including a program that snoops on attached SCSI devices and one that dumps the contents of CD-ROMs, DEBUG-style.

► **Personal Scribe 500 P.** List price: \$6,995. Requires: 386DX/20-based PC or better, 4MB RAM, DOS 5.0 or later. Meridian Data Inc., 5615 Scotts Valley Dr., Scotts Valley, CA 95066; 800-767-2537, 408-438-3100; fax, 408-438-6816.

Circle 475 on reader service card

Pinnacle Micro Inc.

Pinnacle RCD-202

BY JONATHAN HILL

Pinnacle Micro's \$4,195 Pinnacle RCD-202 bundle includes a single-speed CD recorder, RCD-PC premastering software, and an Adaptec 1520A SCSI card. The package, which sells for around \$3,750 on the street, is one of the least expensive combinations we tested and is appealing for its intuitive, full-featured premastering software. However, it requires careful tuning to avoid ruined disks.

SUITABILITY TO TASK

Pinnacle RCD-202

	POOR	FAIR	GOOD	EXCELLENT
Basic premastering	●	●	●	○
Advanced premastering	●	●	○	○

Yamaha's Quad-Speed CDE100

By Jonathan Hill

For many CD premastering tasks, the recorder you buy won't be as important as the software you use. The exception may be the \$5,500 Yamaha CDE100 recorder, a quadruple-speed external drive that was not shipping in time to make our review deadline. If your CD recorder must be fast and

foolproof, then the CDE100 is the drive you'll want.

As we wrote this story, a number of software vendors had just begun bundling the CDE100 with their premastering programs; because of limited-

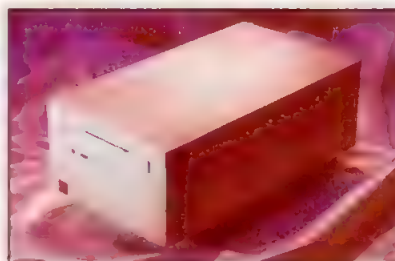
time promotional offers, we were not able to obtain a stable street price. A number of hardware vendors, including JVC, said they were planning to sell an internal version of the Yamaha quadruple-speed drive under their own label as well.

We tested the CDE100 with Version 2.01 of incatsystems' Easy CD-Pro software. Even after we intentionally scattered files over the source hard drive to increase retrieval overhead, the drive had no difficulty producing compact disks on the fly at full speed. Buffer underrun problems that caused ruined disks in some other recorders were thwarted by the Yamaha's 512K on-board buffer.

The Windows-based RCD-PC software is a version of incatsystems software u.s.a.'s Easy CD-Pro that has been customized for the Pinnacle Micro drive. The software opens Windows' File Manager when it loads; to create a CD, you simply drag files from File Manager onto a virtual CD drive to create a virtual image. The software lets you reorder files and will optionally prompt you to change filenames that do not comply with ISO 9660 standards.

You can easily mount the virtual image to simulate CD-ROM performance,

The CDE100's 600-kilobyte-per-second data-transfer rate means that the drive can produce an entire CD in just under 20 minutes. If you want to turn out CDs even more quickly, you can daisy-chain a number of CDE100s together to write disks simultaneously, although this requires an intelligent caching controller. (Tower cases incorporating as many as five CDE100 drives and the required supporting hardware are available from vendors such as Alea and JVC.)



Yamaha's quadruple-speed CDE100 lets you produce a CD in less than 20 minutes.

troller. (Tower cases incorporating as many as five CDE100 drives and the required supporting hardware are available from vendors such as Alea and JVC.)

The Yamaha CDE100 recorder can read and write

CD-ROM XA, CD-I, CD audio (Red Book), and Photo CD disks; it is compatible with MS-DOS, Windows, Macintosh and Unix environments.

Although SCSI configuration is notoriously difficult and the CDE100 did not ship with a SCSI card of its own, we had no difficulty making the drive work with an Adaptec 2742-T EISA-based host adapter in our test-bed systems. □

► **Yamaha CDE100.** List price: \$5,500; internal version, \$5,000. Yamaha Corp. of America, Yamaha Systems Technology Division, 981 Ridder Park Dr., San Jose, CA 95131; 408-437-3133; fax, 408-437-8791.

Circle 482 on reader service card

although testing Windows-unfriendly applications (such as some DOS-based games) requires a few additional steps.

In theory, the RCD-PC software supports writing to the CD on the fly directly from the virtual image. In practice—unless you're writing a small number of very large files—you need to create a true image file first. This may require as much as 680MB on your hard disk, but it's worth the investment to reduce the possibility of buffer underrun and ruined disks—a frequent problem in our testing. Even when




\$3,899*

Think faster.

*John Craig
PC Consultant*

At IBM PC Direct™, we'll help you configure an IBM ThinkPad that's just your speed. You'll be surprised how many options are available. Ask about them.



Hey, you there — the one running at warp speed — this is for you. Slow down and catch a glimpse of one of the fastest notebook PCs around. The IBM ThinkPad® 750Cs.

It has an i486™SL/33MHz processor with an 8KB internal cache to get those high-powered applications really cranking. There's a crystal-clear 9.5" diagonal measurement dual scan color display so you can do less squinting and more doing. And there's a standard full-size keyboard and integrated TrackPoint II™ pointing device for convenience (and control) that's second to none.

The ThinkPad 750Cs even reconfigures faster. Just lift the hood (a hinged keyboard!) to pop in available quick-change hard drives and floppy drives. Special power management features mean you don't have to exit your application to change batteries on the fly. And the weight of the ThinkPad 750Cs

won't slow you down, either. It's a sleek 6.2 pounds, batteries and all.

Go ahead and find the time — call IBM PC Direct to order. And while you're on the line, ask us about an array of options to help you think even faster still.

The IBM ThinkPad 750Cs.
To order yours from IBM PC Direct, get to the phone pronto!

- i486SL/33MHz processor with 8KB internal cache
- 4MB RAM
- 170MB Removable Hard Drive
- 3.5" 2.88MB Removable Floppy Drive
- PCMCIA slots
- 9.5" dual scan color display
- Full-size keyboard with integrated TrackPoint II
- Audio input/output jacks
- 11.7" x 8.3" x 2.0"
- 6.2 lbs with battery pack
- IBM DOS, Introductory Demo and Prodigy® preinstalled
- 3-year international traveler's warranty^b

**To order:
call 1 800 426-7413**

8am-10pm M-F, EDT
9am-5pm Sat., EDT
Purchase order available for qualifying customers.



IBM PC Direct

*We're putting the personal
in personal computing.*

We'll configure any of our newest ValuePoint™ PCs the way you like. See the next page now!



Instant Gratification. We make priced right and

What's new? The "V" series borderless, energy-saving monitors.¹ And Soft Select preinstalled software.

You want it all, right now. (That's O.K., people expect more from IBM.) For instance, you want the latest dazzling monitors.

So we created the new "V" series monitors with a sharp, borderless image. And they're so energy-efficient they've qualified for an EPA Energy Star rating.²

You said, "Installing software takes up too much time." So now we can do it for you at the factory with Soft Select™. We test and optimize each application to work on your particular PC. And we give you customized configurations, plus the quality and support you expect from the world's largest computer company.

So go ahead, be demanding. We're ready for anything. Call us now.

IBM PC Direct

*We're putting the personal
in personal computing.*

ValuePoint Si. Conserve space and money.

- 3 expansion slots, 3 bays
- VESA Local Bus Video
- Pentium³-upgradable (except 425SX/Si)
- IBM Basic 101-Key Keyboard and IBM Mouse
- DOS and Windows preinstalled
- 512KB Video Memory
- Choose your IBM Color Monitor: 14L8, 14V (add \$100 to base model price), 15V (add \$250), 17V (add \$670)

425SX/Si

i486SX/25MHz, 120MB HD, 4MB RAM
14L8 (IBM Credit Lease: \$45/mo.***) \$1,259*

433DX/Si

486DX/33MHz⁴, 120MB HD, 4MB RAM
14L8 (IBM Credit Lease: \$59/mo.) \$1,639*

433DX/Si

486DX/33MHz⁴, 212MB HD, 4MB RAM
14L8 (IBM Credit Lease: \$63/mo.) \$1,749*

466DX2/Si

i486DX2/66MHz, 212MB HD, 4MB RAM
14L8 (IBM Credit Lease: \$77/mo.) \$2,149*

ValuePoint DeskTop. The modern-day workhorse.

- 5 expansion slots, 5 bays
- VESA Local Bus Video
- Pentium³-upgradable
- IBM Enhanced 101-Key Keyboard and IBM Mouse
- DOS and Windows preinstalled
- 1MB Video Memory
- Choose your IBM Color Monitor: 14L8, 14V (add \$100 to base model price), 15V (add \$250), 17V (add \$670)

425SX/D

i486SX/25MHz, 212MB HD, 4MB RAM
14L8 (IBM Credit Lease: \$57/mo.***) \$1,589*

433DX/D

486DX/33MHz⁴, 212MB HD, 4MB RAM
14L8 (IBM Credit Lease: \$69/mo.) \$1,939*

450DX2/D

i486DX2/50MHz, 340MB HD, 4MB RAM
14L8 (IBM Credit Lease: \$81/mo.) \$2,259*

466DX2/D

i486DX2/66MHz, 340MB HD, 8MB RAM
14L8 (IBM Credit Lease: \$99/mo.) \$2,769*

IBM



It's so easy to get the PC you want,
ready to go to work.

ValuePoint Mini-Tower[®].
With room to grow.

- 8 expansion slots, 6 bays
- VESA Local Bus Video
- Pentium[®]-upgradable
- IBM Enhanced 101-Key Keyboard and IBM Mouse
- DOS and Windows preinstalled
- 1MB Video Memory
- Choose your IBM Color Monitor: 14L8, 14V (add \$100 to base model price), 15V (add \$250), 17V (add \$670)

433DX/T

486DX/33MHz[†] 340MB HD, 4MB RAM
14L8 (IBM Credit Lease: \$79/mo.***) \$2,219*

450DX2/T

i486DX2/50MHz, 340MB HD, 8MB RAM
14L8 (IBM Credit Lease: \$92/mo.) \$2,569*

466DX2/T

i486DX2/66MHz, 424MB HD, 8MB RAM
14L8 (IBM Credit Lease: \$107/mo.) \$2,989*

466DX2/T

i486DX2/66MHz, 527MB HD, 8MB RAM
14L8 (IBM Credit Lease: \$112/mo.) \$3,129*

**Soft Select preinstalled software lets you
hit the ground running.**

We can preinstall many of your favorite applications, then thoroughly test and optimize them — all for only a \$10 flat fee. When your new ValuePoint arrives, just plug it in and go. Of course, we also give you the diskettes, manuals and documentation. Installing software doesn't get any easier — or faster.

**Here's just a sampling of
IBM Soft Select applications.**
Call for our latest additions

Microsoft[®] Office (WIN)
Intuit Quicken[™] (WIN)
Borland Quattro Pro[®] (WIN)
Microsoft PowerPoint[®] (WIN)
WinFax[™] Pro (WIN)
WordPerfect[®] (DOS)
IBM VoiceType[™] Control (WIN)

*Salil Muma,
HelpCenter[®]
Specialist*



With HelpWare[®], you're covered by the best support people in the business. IBM HelpWare goes beyond ValuePoint's one-year warranty and our 30-day, hassle-free moneyback guarantee.⁴ HelpWare is tech support people who are always there when you need them, 24 hours a day, 7 days a week. And it's one year of free onsite service, provided by thousands of dedicated IBM service reps who make house calls anywhere in the U.S., no matter how remote.⁵



**To order:
call 1 800 426-7413**

8am-10pm M-F, EDT
9am-5pm Sat., EDT
Purchase order available for qualifying customers.





Don Williams, Jr.
PC Consultant



When Don Williams, Jr. saw the new IBM monitors, he couldn't believe his eyes. He or any of our other PC consultants can't wait to give you the details. These monitors are available separately, or as part of an IBM ValuePoint we'll custom build for you. At a price that's easy on the eyes, too. Call today!

Our newest monitors are even easier on your eyes. Not to mention your electric bill.



Who says you can't have it both ways? These advanced high-resolution monitors deliver a brighter, bolder, crisper, borderless image that's flicker free.

But when you're not using them, they'll automatically power down² to miserly energy consumption levels. When you resume work, just touch a key or the mouse and they'll power up instantly, right where you left off.

Add a CD-ROM drive and find out what you've been missing. Practically all multimedia applications – and more and more regular software titles – are available in CD-ROM format. This internal ISA interface version has a 300KB/Sec maximum sustained data transfer rate with multi-session CD-ROM technology.

The "V" series: for new systems and upgrades, too. Cross-platform compatibility is built in. You can plug it right into almost any IBM-compatible system and run most popular software. These monitors are available in 14", 15" and 17" screen sizes.

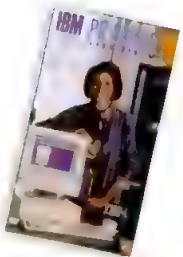
So, see the light. And save energy. Call IBM PC Direct today.

including full Kodak® Photo CD™ compatibility. We can install it for you at the factory so it's ready to go when your IBM ValuePoint arrives.

**ISA Internal
CD-ROM Drive**
(32C2961).....\$245*



Complimentary!
It's the latest edition of the IBM PC Direct catalog. ValuePoints, ThinkPads, printers, monitors, multimedia, software, and more. To get your copy, call IBM PC DIRECT today.



*IBM PC DIRECT prices only. The offerings, prices and products are subject to change or withdrawal without prior notice. Products you acquire may not be counted under any existing Volume Purchase Agreement. The same offerings and products may be available through IBM Authorized Remarketers. Remarketer prices may vary. Shipping and handling charges are extra. **IBM Credit Lease prices are quoted for 36-month terms. Lease rates quoted are good through 6/30/94, after which time rates are subject to change without notice. Lease available to qualified commercial customers only. † Some 486DX/33MHz processors may be manufactured by IBM. 1. 2. The energy saving circuitry is activated by the signals sent from system units that support the VESA DPMS proposal. 3. Upgradable with Intel's future OverDrive™ processor based on Pentium technology. 4. Copies of warranty and 30-day moneyback guarantee information available through IBM and IBM Authorized Dealers. Please call 1 800 426-2968 for details regarding IBM's moneyback guarantee and limited warranty. 5. At no additional charge during warranty period. Onsite service available Monday-Friday 8am-5pm in your time zone. 6. International Traveler's warranty service available in countries where ThinkPad is sold. IBM, ThinkPad, Main-Tower, HelpCenter and HelpWare are registered trademarks, and TrackPoint II, ValuePoint and Soft Select are trademarks of International Business Machines Corporation. All other brands and product names are registered trademarks, trademarks or service marks of their respective holders. PC Direct is a trademark of Ziff Communications Company and is used by IBM under license. ©1994 International Business Machines Corporation

**To order:
call 1 800 426-7413**

8am-10pm M-F, EDT
9am-5pm Sat., EDT
Purchase order available for qualifying customers.

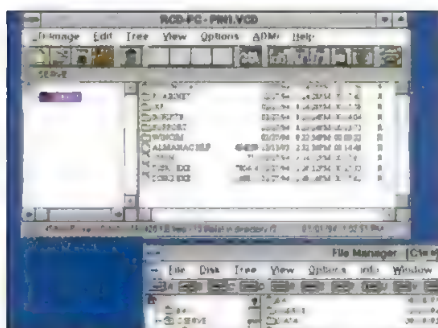


IBM PC Direct

*We're putting the personal
in personal computing.*

writing a disk from an image file, the RCD-PC system remains fragile: In one case we destroyed a disk simply by shutting down the Windows Clock accessory while writing to the drive.

We had no problems, however, using incatsystems' Easy CD-Pro software with the Yamaha CDE1000 recorder (see the sidebar entitled "Yamaha's Quad-Speed CDE100"), which leads us to believe that Pinnacle Micro could solve the prob-



Pinnacle's RCD-PC software lets you drag files into a virtual CD window.

lem simply by increasing the size of the RCD-202 drive's on-board buffer.

The basic Pinnacle package can create standard ISO 9660 and DOS CD-ROMs, Red Book audio CDs, and mixed-mode disks that combine data and audio; it also supports multisession recording. A Macintosh version of the software, sold separately, lets you make Macintosh HFS disks. The company says it will eventually offer an upgrade to the

Mac version to support CD-ROM XA Mode 1 and CD-I.

► **Pinnacle RCD-202.** List price: \$4,195. Requires: 386DX/33-based PC or better, 4MB RAM, Microsoft Windows 3.1, VGA adapter. Pinnacle Micro Inc., 19 Technology Dr., Irvine, CA 92718; 800-533-7070, 714-727-3300; fax, 714-727-1913.

Circle 476 on reader service card

Microboards Inc.

PlayWrite 1000

BY JONATHAN HILL

Ricoh's single-speed RS-9200 CD recorder and Dataware Technologies' CD-Record software comprise the PlayWrite

Write-Once Archiving with CD-R

By Jonathan Hill and James Karney
CD recorders' strength is CD-ROM premastering, but CD recorders are also worth considering if you need to archive large amounts of data. Not only is CD-recordable media designed to last for decades—it's immune to magnetic fields that can damage traditional backup media—but it is unalterable once written, making it ideal for situations where a long-term audit trail is required.

CD-R's competition in this niche is the WORM (write-once, read-many) drive. The advantage CD-R has over WORM is standardization; you can read CD-R disks in any inexpensive CD-ROM drive rather than requiring a WORM drive from the same manufacturer whose equipment was used to record the disk originally.

We examined two hardware/software archiving combinations: JVC's Personal Archiver system, a single-user unit, and Meridian Data's NetScribe 1000, a self-contained Novell NetWare CD-R server. These units were selected to offer a taste of CD-R archiving capabilities and are not representative of all products. Some of the other vendors reviewed here, including CD-ROM Strategies

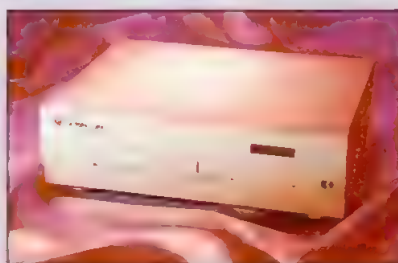
and incatsystems software, also offer archiving software of their own.

JVC's Personal Archiver has a list price of \$4,100 to \$7,995, depending on the configuration. To archive files using Personal Archiver, you first copy your files to a 680MB partition that you set up on the host machine or to a dedicated 1.2GB drive that

comes with the CD-R drive in an optional mini-tower enclosure. (You can use standard DOS commands, the Windows File Manager, or a backup utility.) Then you simply run the Personal Archiver program, choose "Make CD-ROM," and wait (about an hour for 600MB of data).

The NetScribe 1000 is a Novell NetWare server with 4MB of RAM and a 207MB hard disk; twisted-pair, thin coaxial, and thick (AUI) Ethernet connectors are standard. NetScribe supports IPX, so it also works with Windows for Workgroups. Once installed, the

NetScribe looks just like a standard NetWare disk volume: Using the Windows File Manager or any other disk-management utility, you can drag-and-drop files directly onto the drive. When you have selected all the appropriate files, you can record them to the double-speed drive on the fly. □



The network sees Meridian Data's NetScribe 1000 as a hard disk, letting you transfer files directly to a CD using Windows' File Manager.

► **JVC's Personal Archiver.** List price: Mini-tower with 1.2GB hard disk, \$7,995; external model, \$4,595; internal, \$4,100. JVC Information Products, 17811 Mitchell Ave., Irvine, CA 92714; 714-261-1292; fax, 714-261-9690. Circle 483 on reader service card

► **NetScribe 1000.** List price: \$9,995 (five-user license). Requires: IPX-based network (Novell NetWare or Microsoft Windows for Workgroups), 640K RAM, DOS 5.0. Meridian Data Inc., 5615 Scotts Valley Dr., Scotts Valley, CA 95066; 800-767-2537, 408-438-3100; fax, 408-438-6816.

Circle 484 on reader service card

► **SUMMARY OF FEATURES**

CD-R Premastering Kits



■ - YES □ - NO

	CD-Gen for DOS	JVC's Personal RomMaker	Personal Scribe 500 P	PlayWrite 1000	QuickTOPIX/Windows	Pinnacle RCD-202	Simpli-CD	WinOnCD
List price (hardware and software)	\$6,745 (with Philips CDD 521 drive)	\$9,995	\$6,995	\$3,899	\$7,495 (with Sony CDW 900E drive)	\$4,195	\$6,495 (with Philips CDD 521 drive)	\$7,249 (with Philips CDD 521 drive)
Included SCSI adapter	None	Adaptec 1510	Adaptec 1542C	None	None	Adaptec 1520A	Adaptec 1542C	None
Hardware and software sold as package	□	■	■	■	■	■	■	□

PREMASTERING SOFTWARE

Software developer	CD-ROM Strategies Inc.	JVC Information Products	Meridian Data Inc.	Dataware Technologies Inc.	Optical Media International Inc.	incatsystems software u.s.a., Pinnacle Micro Inc.	Young Minds Inc.	CeQuadrat
Software name	CD-Gen for DOS 2.13	JVC's Personal RomMaker 1.51	Personal Scribe 1.2	CD Record 2.0	QuickTOPIX/Windows 1.2	Pinnacle RCD-PC 2.01	Simpli-CD 1.1	WinOnCD 2.05
List price for software alone	\$1,495	N/A ①	\$995	\$1,995	\$1,995	N/A ①	\$695	\$1,999
DOS/Windows versions available	■ ■	■ ■	■ □	■ □	□ ■	□ ■	□ ■	■ ■
Not copy-protected	■	■	■	■	□	■	■	■
Recording formats supported								
High Sierra/Red Book audio (CD-DA)	■ ■	■ ■	■ ■	■ ■	□ □	■ ■	□ □	■ ■
CD-ROM XA (Mode 2)/Photo CD	■ ■	■ ■	■ ■	■ □	□ □	■ ■	■ □	■ ■
Mixed-mode (Red Book and data)/CD-I	■ □	■ □	■ □	■ □	□ □	■ □	□ □	■ ■
Rock Ridge (Unix)/Mac HFS	□ □	■ ■	□ □	■ □	□ ■	□ □	□ □	□ □
Hybrid (ISO 9660 and Mac HFS)	□	□	□	□	■	□	□	□
Data Discman/MiniDisc Data	□ □	■ ■	□ □	□ □	□ □	□ □	□ □	■ ■
Multisession	■	■	■	■	□	■	■	■
MPEG/239.50 compression	□ □	□ ■	□ □	□ □	□ □	□ □	□ □	□ □
User can control order of files on CD	■	■	■	■	□	■	□	■
User can specify exact logical/physical block addresses of files on CD	■ ■	□ ■	□ □	□ □	□ □	□ □	□ □	■ ■
Detects and compresses holes in disk image	■	■	■	■	□	■	■	■
Simulates performance	■	■	□	■	■	■	□	■
Converts non-ISO 9660 filenames	■	■	□	■	■	■	■	■
Writes UPC number for audio CDs	□	□	□	■	□	■	□	■
Accepts input from any SCSI device	■	■	■	□	■	■	□	■
Copies tracks from existing CDs or CD images	■	■	■	■	□	■	□	■
Verifies disk after write	■	■	□	■	■	■	□	■
Premastering formats supported								
DAT/ExaByte/9-track reel-to-reel	□ ■ □	■ ■ □	■ ■ □	■ ■ ■	■ ■ ■	□ ■ □	□ □ □	□ □ □

CD-R HARDWARE

CD recorder made	Philips CDD 521	JVC XR-WTJ01	Philips CDD 521	Ricoh RS 9200	Sony CDW 900E	Pinnacle RCD-202	Philips CDD 521	Philips CDD 521
List price for recorder alone	\$5,250	N/A ①	\$5,250	N/A ①	\$7,500	N/A ①	\$5,250	\$5,250
Recorder speed	Double	Single	Double	Single	Double	Single	Double	Double
Internal model available	□	■	□	□	□	■	□	□
Size of internal hard disk	N/A ②	1.2GB	N/A ②	N/A ②	N/A ②	N/A ②	N/A ②	N/A ②
Size of data buffer	256K write, 64K read	64K	256K write, 64K read	1.2MB	3MB	64K	256K write, 64K read	256K write, 64K read
Can daisy-chain for simultaneous writing	□	■	□	□	■	□	□	□
Can read back CD-R media	■	■	■	■	□	■	■	■
Minimum sustained transfer speed required of host hard disk	500 KBps	1 MBps	700 KBps	600 KBps	300 KBps	1 MBps	150 KBps	No minimum requirement

SUPPORT AND SERVICE

Toll-free technical support	■	■	■	■	■	■	■	■
Telephone support hours (eastern time)	11:00-8:00 M-F	12:00-8:00 M-F	10:00-8:00 M-F	8:00-8:00 M-F	11:00-8:00 M-F	10:30-8:30 M-F	10:00-8:00 M-F	11:00-8:00 M-F
BBS/CompuServe forum	□ □	□ □	■ ■	■ □	■ □	□ □	□ □	■ □
Warranty	1 year	1 year	1 year	1 year	1 year	1 year	1 year	1 year

NA ① -Not applicable. This component cannot be purchased separately.

NA ② -Not applicable. This unit does not have an internal hard disk.

"Double Speed Multimedia Madness!"

Call Now for VIDEO GALAXY!

Meld Sight and Sound Like Never Before!

Hotter than ever! Aztech Labs has the industry buzzing, and we're ready to jazz up your life.

Join the Sound Galaxy Multimedia explosion and open your mind to a new era for your PC. In one exciting package Aztech Labs delivers the latest technology in MPC II compliant multimedia hardware with 21 new and powerful business and multimedia CD-ROM and software titles. From the roar of a T-Rex, to the melodies of Mozart, meld sight and

sound with the

"Ultimate Upgrade" from Aztech Labs!



motorized loading tray, the finest on the market, is combined with the latest in business and

multimedia software, including ComVoice, the next

level in voice recognition software. Add high quality Powered Stereo Amplified Speakers, a Microphone,

and as a special introductory offer, a free CD Carrying Case to make this the most complete package on the market.

Buy Aztech's Wave-Table Synthesis upgradeable Sound Galaxy Double Speed Pro 16 Multimedia Upgrade Kit, and lead the Multimedia

Revolution into the future!

5 Hot CD Titles are Included
Software Toolworks™ Multimedia Encyclopedia, Battle Chess Enhanced CD-ROM, Space Quest IV, Macromedia Action, & Jones in the Fast Lane!

Double Speed Pro from Aztech!

Sound Galaxy thrusts you to the head of the Multimedia Revolution with this hot package! The Sound Galaxy Pro 16L audio card with Sound Blaster Pro, Microsoft Windows Sound Source, and AdLib sound standard compatibility is the cornerstone of this fantastic kit. LMSI's high performance Double Speed CD-ROM drive with

Full Spectrum of Sound Galaxy Multimedia!

With 8-Bit mono to full 16-Bit stereo digital audio cards, WavePower Wave-Table Synthesis, and the a full range of Multimedia Upgrade kits, including the new Sound Galaxy Double Speed Pro 16 Multimedia Upgrade Kit, Aztech is the industry's multimedia compatibility leader! Join the "Double Speed Explosion". Visit your dealer today and insist on Sound Galaxy! For Dealer info call 800-886-8859.



The Ultimate in Technology
Sound Galaxy 16-Bit boards support the MPU 401 MIDI interface standard and Wave-Table Synthesis!



SOUND GALAXY

"Pioneering the Multimedia Explosion!"
A product of Aztech Labs, Inc.



AZTECH

46707 Fremont Blvd., Fremont, CA 94538. U.S.A. Tel: (510) 623-8988 Fax: (510) 623-8989

© 1993 Aztech Labs, Inc. Aztech, the Aztech logo, and Sound Galaxy are trademarks or registered trademarks of Aztech Labs, Inc. All other names are trademarks or registered trademarks of their respective holders. Specifications, terms, and services subject to changes without notice.

CIRCLE 318 ON READER SERVICE CARD

HARDWARE

CD Recorders

1000, \$3,899 direct from Microboards. (The software alone is available for \$1,995.) An entry-level system whose primary appeal is low cost and cross-platform compatibility, the PlayWrite 1000's premastering capabilities are limited by a crude software interface.

CD-Record can be run as a series of command line programs, and much of the package's functionality is, in fact, inaccessible

from the program's main menu. You cannot, for example, create a virtual CD image from within the main program. In most cases, preparing a CD-ROM is thus a multistep procedure.

First, you create a "mapping file" that contains the list of files to be included in the virtual CD image using the program's built-in text editor. Then you run a command line program to create a virtual CD

SUITABILITY TO TASK

PlayWrite 1000

	POOR	FAIR	GOOD	EXCELLENT
Basic premastering	●	●	○	○
Advanced premastering	●	●	●	○

image. Next, start CD-Record, select the virtual CD image as input, and output that image to the CD recorder. CD-Record lets you reorder files on the disk and will prompt you to change filenames that do not comply with ISO 9660 standards. An included utility lets you simulate CD-ROM performance.

The software supports CD-ROM XA recording and lets you create mixed-mode (part data, part digital audio) disks by using cue sheets and another command line utility. The PlayWrite 1000 also supports both incremental and multisession recording and can record on the fly.

The CD-Record package exists in SunOS, HP-UX, NEC EWS 4800/220, MS-DOS, and Macintosh versions. The



CD-Record, Microboards' PlayWrite 1000 software, uses a combination of pull-down menus and command line utilities.

DOS version allows you to create ISO 9660 disks with Rock Ridge extensions; these can be read by CD-ROM drives connected to Unix systems.

Microboards offers only 1 hour of free technical support with the PlayWrite 1000; additional technical support is charged at \$80 per half hour.

► **PlayWrite 1000.** List price: \$3,899. Requires: 386/33-based PC or better, 2.5MB RAM, DOS 3.3 or later. Microboards Inc., 308 Broadway, P.O. Box 130, Carver, MN 55315; 800-225-4414, 612-448-9800; fax, 612-448-9806.

Circle 477 on reader service card

Finally, Accurate OCR.

Introducing WordScan™ Plus 3.0 The only OCR with Adaptive Recognition Technology.™

You'll be amazed. New WordScan Plus 3.0 for Windows™ rips through tough OCR jobs with an accuracy you've never seen before. It shatters every assumption you have about OCR software. Because it runs up to eight separate recognition algorithms on every scan. No other OCR package even comes close.

Add to that H.P.'s AccuPage™ 2.0 technology, our Chameleon Tool Bar™ that mimics your word processor's icons, HoverHelp™, and OLE 2.0 support, and you've got incredibly accurate OCR software that's also incredibly easy to use.

But don't just take our word for it. Take the WordScan Plus 30-day



free trial and judge for yourself. You'll get the OCR accuracy you've always wanted. Finally.

**30-day Free Trial And
\$99 Competitive Upgrade***

1-800-422-5372 Ext.500

Every 100th Caller Gets the \$595
WordScan Plus 3.0 FREE!

CALERA

UNBEATABLE OCR ACCURACY

*OMNIPAGE USERS: Upgrade to the breakthrough accuracy of WordScan Plus 3.0 for only \$99 with proof of ownership. © 1994 Calera Recognition Systems, Sunnyvale, CA. 408-720-8300 FAX: 408-720-1330. Offer limited to the first 10,000 callers.

New Version 3.0!
30-day Free Trial Offer

Philips Brilliance 17" Monitors Unleash The Power Of Windows.

Philips innovation gives you outstanding performance for Windows applications.

- High resolution up to 1600 x 1280.
- FastRefresh™ for stable, flicker-free picture; redraws up to 76 Hz in 1280 x 1024*.
- Flat square screen with fine 0.27 dot pitch.
- EBU phosphor screen displays realistic, brilliant colors.
- Image easily adjusted with microprocessor-based digital controls.
- Low emissions comply with MPR-2 standards.



Call 1-800-835-3506

In Canada, 1-800-387-0564

*Actual refresh rates may vary by video controller and/or software.

© 1994 Philips Consumer Electronics Company, A Division of North American Philips Corporation.

PHILIPS BRILLIANCE MONITORS			
CRT	15" FS, 14" V, 25mm	17" FS, 16" V, 27mm	17" FS, 16" V, 28mm
MPR-2 VLF/ELF	YES	YES	YES
MAX. RESOLUTION	1024 x 768	1600 x 1280	1600 x 1280
OPTIMUM RESOLUTION	800 x 600 at 75 Hz	1024 x 768 at 76 Hz	1280 x 1024 at 76 Hz
MAC RESOLUTION	832 x 624 at 75 Hz	1024 x 768 at 75 Hz	1152 x 864 at 75 Hz
DOT RATE	75 MHz	135 MHz	150 MHz
SCAN RATE (H)	30-58 KHz	30-82 KHz	30-82 KHz
SCAN RATE (V)	50-100 Hz	50-120 Hz	50-160 Hz
AUDIO INPUT	YES		
DIGITAL CONTROL		YES	YES
WARRANTY	3 YEARS	3 YEARS	3 YEARS

Another First From Philips

BRILLIANCE™
HIGH RESOLUTION MONITORS



PHILIPS

CIRCLE 246 ON READER SERVICE CARD

HARDWARE
CD Recorders

Optical Media International Inc.

QuickTOPIX/Windows

BY JAMES KARNEY

Optical Media International's QuickTOPIX/Windows presents a friendly user interface that makes it appealing for many simple applications. But the software's copy-protection scheme, which requires a hardware device, is a nuisance, and its lack of provisions for recording Red Book digital audio is limiting. (Version 2.0 of the software, which should be shipping by the time you read this, will support Red Book audio.)

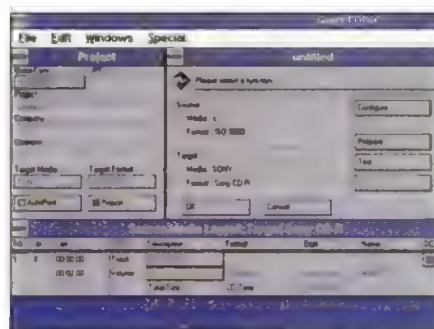
The company bundles QuickTOPIX with a Sony CDW-900E double-speed CD-R drive for \$7,495—the same price that the recorder itself lists for. The software, which alone costs \$1,995, also works with the Kodak PCD 200 Writer, the Philips CDD 521,

and the Ricoh RS-9200 CD-R drives.

To begin the premastering process, you specify the type of disk you want to create; QuickTOPIX builds an iconic receptacle into which you drag the files and directories you want to include. This approach is easy and intuitive, but it doesn't allow you to reorder the location of files on a disk.

Before committing the data to the CD, you can simulate your application to ensure that it works properly. More impressively, QuickTOPIX lets you perform a dry run with your data, enabling you to be sure that your system can maintain a transfer rate fast enough to prevent buffer underruns and ruined disks.

OMI further recommends that you create a RAM disk on the host system that the software can use as a secondary buffer during recording. With the RAM disk enabled, the software worked as promised.



QuickTOPIX/Windows lets you simulate the recording process to see if your system maintains a fast enough data-transfer rate to avoid buffer underrun.

OMI's technical support was difficult to reach—the company provides only a fax number in the software manual—and a representative's knowledge of the product was limited. A company spokesman told us that OMI was in the midst of staff changes and was preparing to provide better service.

► **QuickTOPIX/Windows.** List price: With Sony CDW-900E drive, \$7,495. Requires: 486-based PC or better, 4MB

CRAIG BROWN'S
OVERHEAD PRESENTATION
WAS SO IMPRESSIVE
NO ONE NOTICED THE
GUACAMOLE ON HIS TIE.

RAM, Adaptec SCSI host adapter, Microsoft Windows 3.1, parallel port. Optical Media International Inc., 180 Knowles Dr., Los Gatos, CA 95030; 800-347-2664, 408-376-3511; fax, 408-376-3519.

Circle 478 on reader service card

Young Minds Inc.

Simpli-CD

BY ALFRED POOR

Young Minds pairs a Philips CDD 521 double-speed CD recorder and an Adaptec 1542C SCSI controller with the company's own Simpli-CD software; the combination, which is currently available only from Young Minds, lists for \$6,495. The Simpli-CD software, also available separately for \$695, is designed to work with new drives from Kodak and Yamaha as well.

Simpli-CD lives up to its name, handling basic premastering tasks easily and reliably behind a Windows interface. The program, however, lacks support for many of the more esoteric CD-ROM

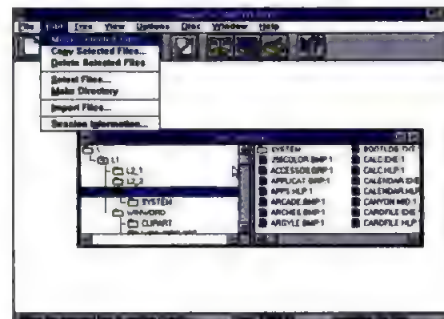
SUITABILITY TO TASK				
Simpli-CD				
	POOR	FAIR	GOOD	EXCELLENT
Basic premastering	●	●	●	●
Advanced premastering	●	●	○	○

recording formats: It cannot even produce standard Red Book audio compact disks, although the company says that a new release of the software, to be available by the time you read this, will provide Red Book support.

Simpli-CD does not require you to dedicate a full 680MB on the host system to store an image of the files you wish to place on the CD. Instead, you can specify a buffer of any size; if the amount of data you wish to write is too large to fit within the buffer, the program will break it down and write the contents of the buffer as one of a number of tracks. (You can have multiple tracks even on a single-session CD-ROM, just as audio CDs use separate tracks for each song.) While this approach is convenient, it also means you forgo

detailed control over the location of files on the disk; instead, Simpli-CD will order your files as it deems appropriate. For an ISO 9660-compliant disk, that means alphabetically. Simpli-CD will let you rename filenames that don't comply with ISO 9660 standards, but beyond that it allows you little direct control over the disk image.

For each session you want to write, you just open a Simpli-CD window and assemble the data you wish to record. You can do this by importing files and



Although Simpli-CD lacks some advanced premastering functions, its straightforward Windows display was the easiest to learn.



Incredible overheads and prints that rivet your audience's attention. Made easily and affordably. Right at your desktop.

The KODAK COLOREASE PS Printer. Continuous-tone transparencies and prints. Superb resolution. Plus UltraColor Software from Kodak that gives you great color the first time, and every time. True Adobe PostScript® Level 2. Fully compatible with your MACINTOSH Computer or WINDOWS Software. With simultaneous printing and processing to maximize your productivity. No other printer can do so much, so fast.

What you eat for lunch is your business. Helping you look your best in your presentation is ours. Give yourself a competitive edge with the KODAK COLOREASE PS Printer. Because nobody knows color like Kodak.

Call 1-800-344-0006 in U.S. or 1-800-465-6325 in Canada for a sample transparency and dealer information.

Postscript is a trademark of Adobe Systems, Inc., registered in the U.S. and other countries. Kodak and ColorEase are trademarks. © Eastman Kodak Company, 1993.

CIRCLE 382 ON READER SERVICE CARD

KODAK
ColorEase
PS Printer



FREE CATALOG!



Five Reasons To Shop Inmac For Your PC Hardware And Software

- 1 **Low Prices** On Every Product, Every Day.
- 2 **Largest Selection** Of PC Hardware And Software Available.
- 3 **Satisfaction Guaranteed** With Inmac's 30-Day Warranty.
- 4 **Fast Shipment** Call By 5 p.m. And It's Shipped The Next Day.
- 5 **Easy Ordering** Just Pick Up The Phone And Call Toll-Free.

**CALL TOLL FREE
1-800-972-9240**

Or FAX 1-800-972-3210, 24 Hours A Day

YES! Please reserve my **FREE** copy of the INMAC PC Select Catalog.

Your Name _____ Title _____

Company _____ # of employees at your company _____

Division/Department/State # _____

Address _____

City _____ State _____ Zip _____

Area Code _____ Day Phone _____

**Mail To: Inmac, 2485 Augustine Drive
Santa Clara, CA 95052**

Priority Code **S940505** **inmac**

CIRCLE 052 ON READER SERVICE CARD

HARDWARE CD Recorders

directories or use drag-and-drop techniques from within the Windows File Manager, The Norton Desktop, or XTree for Windows.

The software also includes DOS drivers which ensure that the CD application functions before you record the data and that you can read CD-ROMs on the Philips CDD 521 drive. Simpli-CD also supports multisession recording; the package includes a Windows utility that instructs the Philips CDD 521 to read a specified session from a multisession CD.

EDITORS' CHOICE ▶ **Simpli-CD.** List price: With Philips CDD 521 drive, \$6,495. Requires: 386DX/33-based PC or better, 4MB RAM, DOS 5.0 or later, Microsoft Windows 3.1. Young Minds Inc., P.O. Box 8130, Redlands, CA 92375; 800-964-4964, 909-335-1350; fax, 909-798-0488.

Circle 479 on reader service card

Philips LMS

WinOnCD

BY ALFRED POOR

Philips' \$1,999 WinOnCD software has a point-and-click interface that makes pre-mastering easy, although it lacks the detailed control over CD encoding that some other programs offer. The company no longer bundles the software with its \$5,250 Philips CDD 521 double-speed CD recorder (the configuration we tested), but resellers who do often sell the combination for as little as \$4,600.

As its name implies, WinOnCD is a Microsoft Windows application, and it makes excellent use of the graphical interface. Creating a disk from DOS files is quick and easy: Simply click on the New ISO button in the New TOC (table of contents) window, click on the directory you want, and choose the Make CD command on the File menu.

The WinOnCD software consolidates the source data into a true image file prior to writing it to the CD, a process that takes about half an hour for 600MB. This image data can be reused to premaster multiple disks. Supplied software lets you



WinOnCD software lets you mix tracks of different modes and submodes in a single session.

convert .WAV files into Red Book audio tracks, either as a second track on a single-session CD or as a separate session on a multisession disk.

You can, if you wish, create a disk using non-ISO 9660 compliant file and directory names. WinOnCD does not permit you to reorder files on the disk, but it will let you simulate your application's operation.

We ran into one problem with the program when we tried to write an audio CD track: WinOnCD demands that you write audio tracks at 150 kilobytes per second even if the rest of the disk is written at 300 KBps. Not only was this unexpected—there's no fundamental reason that audio data can't be written at the same speed as any other data—but it was undocumented.

(A Philips spokesman informed us that this peculiarity arises because the buffer size of the CD-R drive is reduced to 64K when it is recording audio

tracks under Windows, but other packages we tested with the same drive did not present this problem.)

The WinOnCD package comes with some handy utilities to help you analyze installed SCSI devices and examine the low-level contents of CD-ROMs, particularly audio CDs. □

▶ **WinOnCD.** List price: With Philips CDD 521 drive, \$7,249. Requires: 486-based PC or better, 8MB RAM, 1MB hard disk space, DOS 4.0 or later; Windows 3.1. Philips LMS, 4425 Arrows West Dr., Colorado Springs, CO 80907; 800-777-5674.

Circle 480 on reader service card

SUITABILITY TO TASK

WinOnCD

	POOR	FAIR	GOOD	EXCELLENT
Basic premastering	●	●	●	●
Advanced premastering	●	●	●	○

COREL DRAW!™

THE BEST BY FAR!



PC World's Annual
World Class Award
First Choice for
Draw Software
December, 1993



WINNER OF OVER
120
FIRST PLACE AWARDS

The results are in!
The overwhelming majority of readers have selected CorelDRAW as their first choice for Draw Software in **PC World's Annual World Class Award Survey**. CorelDRAW is an amazing award-winning graphics package. With over 120 international first place product awards, CorelDRAW is celebrated worldwide for its ease of use, outstanding features and incredible value. CorelDRAW 3 is the perfect entry-level graphics software. CorelDRAW 4 has all the capabilities and features of CorelDRAW 3...and more. It includes page layouts, animation and OCR, hundreds of other feature enhancements, over 750 fonts and a complete library of 18,000 clipart images, symbols, animation elements and sound effects on CD-ROM. It's the best value in software today—and it's still the easiest to use! Year after year, survey after survey, users make CorelDRAW their first choice.

*No wonder CorelDRAW is
the world's best selling graphics software.*



1-800-826-3928



\$378

\$139.95

COREL®
613-728-3733

KL9-0017

THE NEXT GENERATION OF DESK

Over the [Desk] Top

By Lance Ulanoff

Yesterday's desktop publishing packages have grown in stature to become today's professional-level tools, while entry-level products carve out their own niche and win over nondesigners' hearts. The key to selecting the right product is to assess your needs *and* your own abilities.



Today's desktop publishing software offers a harvest of exciting features and better ease of use for both entry-level and professional desktop publishers. While yesterday's desktop publishing tools fell on either side of a wide chasm—either really low-end (easy to use, but not at all powerful) or very powerful (but often relying on tagged data and archaic codes to control the text on a page)—today's packages instead fall on a continuum. As a result, you are likely to find the right combination of features and ease of use somewhere in the crowd.

As we look at a new group of desktop publishing products, we discover that more than just the names have changed. In addition to falling into somewhat more

Photography by Scott Peterson

TOP PUBLISHERS

attractive categories, *entry-level* and *professional-level*, the nine DTP products we selected for review have bridged the gap. Their abilities now span a continuum of publishing tasks. In fact, this is one of the widest and richest fields in desktop publishing we have ever covered, and choosing the product to fit your needs will require some thought about the types of documents you expect to create (for more information, see the sidebar "A DTP Continuum"). In addition, you'll have to think about document portability and product expandability.

We rounded up nine products—Corel Ventura, Version 4.2; FrameMaker for Windows, Version 4.0; Aldus PageMaker for Windows, Version 5.0a; QuarkXPress for Windows, Version 3.3; CompuWorks Publisher for Windows, Version 1.0; Microsoft Publisher, Version 2.0; PagePlus for Windows, Version 2.0; PFS: Publisher; and Publish It! for Windows, Version 3.1—all Microsoft Windows-based and all able to handle Adobe Type 1 fonts, TrueType fonts, or both. Both entry- and professional-level products have made significant strides in bridging the gap between the product classes while at the same time solidifying their positions with a number of key features aimed squarely at their core audiences.

In the professional-level arena, the big news is better color-management and color-matching systems. Most notably, QuarkXPress 3.3 introduced its EfiColor QuarkXTension, a system for matching monitor-displayed colors with colors from output devices. Additionally, both Aldus and Quark have opened the door to third-party vendors to build add-ons for their products, called Aldus Additions and QuarkXTensions, respectively. For our roundup, we addressed only those add-ons that come bundled with the products.

Other vendors, such as Frame Technology Corp., have taken commendable steps to simplify their prod-



ucts' interfaces. Corel Ventura, on the other hand, is undergoing more of a sea change. Corel Corp., which recently purchased Ventura from Xerox Corp., says it will continue to sell Corel Ventura 4.2, but that the next version of the product will be a part of that mastodon of graphics on the PC, CorelDRAW for Windows, Version 5.0. In addition to a major interface overhaul, Corel Ventura 5.0 should also feature a new color-matching system.

Entry-level DTP vendors have also been busy adding a smattering of professional-level features to fill in the gap. PagePlus, for example, is often compared with PageMaker and shares many of its features, including the pasteboard metaphor; it even offers some color-separation abilities. On the other hand, too many powerful features available at the menu level to novice users can be a





daunting and even dangerous thing. Daunting for the new users, and dangerous for the company that could lose confused customers.

Microsoft Publisher, however, takes a different approach. It features the richest set of automation routines, such as Page Wizards and cue cards, of any product in its class.

MORE POWER

Entry-level or pro, everyone can appreciate the benefits of 32-bit, multithreading platforms. Many vendors, including Quark and Timeworks International, have definite plans to revise their products for these next-generation operating systems, including Windows NT and Chicago (the code name for the next version of Microsoft Windows). Microsoft already has a 16-bit version of Microsoft Publisher for Windows NT. Considering its audience, the need for a 32-bit version of Publisher is debatable.

Nevertheless, a powerful operating system is only as strong as the hardware it runs on. Enter the PowerPC and other second-generation chips. Ask any designer about these powerful silicon slabs and the excitement is palpable. The PowerPC chip (developed by Apple, IBM, and Motorola) and the Alpha chip (developed by Digital Equipment Corp.) offer the degree of power professional designers have been craving since the first time someone tried to rotate a 13MB TIFF file.

The good news is that vendors are taking notice, too. The bad news for PC users is that the first PowerPC platform you'll find one of your favorite DTP tools running on is a Macintosh running Apple's System 7. Quark is readying a PowerPC

EDITORS' CHOICE

- *Design-intensive layout*.....**QuarkXPress for Windows, Version 3.3**
- *Long technical documents*.....**FrameMaker for Windows, Version 4.0**
- *Basic desktop publishing*.....**Microsoft Publisher, Version 2.0**

In the PC industry, as in everyday life, there are few absolutes. To select the *absolutely* best desktop publishing (DTP) product for all your needs is impossible.

In the course of our testing we were faced with strong contenders in both the professional-level and entry-level categories. But no single, ultimate DTP product emerged.

Our decision to award dual Editors' Choice awards for professional-level products to Frame Technology Corp.'s FrameMaker for Windows, Version 4.0, and Quark's QuarkXPress for Windows, Version 3.3, was not a simple one. Nobody believes that either product is the ideal package for all professional-

level tasks, but both products excel in some areas. In the entry-level arena, the choice was somewhat easier. Microsoft Publisher, Version 2.0, our Editors' Choice winner for entry-level desktop publishing packages, displayed the clearest understanding of its market. Power and especially ease of use have been intelligently packaged under the hood of this modestly priced product.

This is the second time we have selected the two professional-level products for commendation, and the

version of QuarkXPress for the Mac, but its plans for Windows NT on the PowerPC depend largely on when the operating system is ready to run on the new chip. Interleaf 6's Windows version was not ready in time for review; however, Interleaf says that it is committed to porting its Microsoft Windows-based electronic publishing system to a Windows NT version for the Digital Alpha chip.

NEXT GENERATION

Desktop publishing's future looks even brighter than its present. A number of

the major players in the field (especially in the professional-level arena) are on the verge of introducing powerful new tools that will enable faster creation of complex layout designs. They're also readying real document-publishing systems that coordinate everything from the creation of text to the management of files (both graphic and text) throughout the production system to allow multiple users simultaneous access to a document.

The next frontier and the direction in which almost every piece of business-class software is heading is workgroup capability. DTP products such as PageMaker and QuarkXPress have provided cross-platform compatibility for some time now, but that is only part of the workgroup story. Network ability plus simultaneous multiple access of documents are hallmarks of tomorrow's desktop publishing products (for more details, see the sidebar "A Group Publishing Effort").

Where do we go from here? Straight ahead, because the tools at the disposal of desktop publishers, novice and professional alike, are ready to till the fields of their dreams.

IN THIS REVIEW

Corel Ventura, Version 4.2	177	Publish It! for Windows, Version 3.1	204
FrameMaker for Windows, Version 4.0	181	Professional Desktop Publishing	167
PageMaker for Windows, Version 5.0a	182	Highlights	170
QuarkXPress for Windows, Version 3.3	186	A DTP Continuum	175
CompuWorks Publisher for Windows, Version 1.0	197	How We Tested	176
Microsoft Publisher, Version 2.0	199	Suitability to Task	178, 190
PagePlus for Windows, Version 2.0	200	... And Then There's Interleaf	184
PFS: Publisher	202	A Group Publishing Effort	186
		Illustration Software for DTP	188
		Entry-Level Desktop Publishing	190
		Summary of Features	194

circumstances remain relatively unchanged. For its part, QuarkXPress is still the undisputed design champion. It handled our complex two-page layout with an ease and aplomb that other products can only dream about. There are no brick walls when you design with QuarkXPress, perfectly exemplified by its ability to place text inside a diamond-shaped box versus PageMaker's visible inability.

The biggest improvements to QuarkXPress since the last time we reviewed the product are the perfect version synchronization with its Macintosh cousin, and more importantly, the EfiColor matching system. This tool will automatically alter the monitor's screen colors to match your desired output source—something professionals have been dreaming about for years. So where does QuarkXPress fall short? Long documents. And that's just where our second Editors' Choice winner takes over.

FrameMaker is unmatched in long-document creation. It holds together the disparate pieces of manual-like tomes while maintaining textual integrity at every turn.

However, since neither product could perform both the highly designed layout and long document tasks with equal ability, we must award an honorable mention to PageMaker for Windows, Version 5.0a. Though arguably easier to use than either of the Editors' Choice winners, it cannot surpass them in depth or quality of features. What it does offer is a broad features set with enough ability to satisfy a small graphic design firm or home office. To vault into Editors' Choice contention next time around, Aldus must revamp PageMaker's code base and better integrate the somewhat kludgy Aldus Additions that currently offer most of the product's necessary automated routines (such as drop caps and running headers and footers).

For entry-level DTP products the choice was clear: Microsoft Publisher, Version 2.0, refined and built upon what was best about Version 1.0. The PageWizards are the perfect interactive tools for the first-time desktop publisher. And when users gain more experience, Publisher steps aside and allows them to take more control.

Where does Publisher end and QuarkXPress begin? Probably somewhere right around Serif's PagePlus for Windows, Version 2.0. This product caught our eye with its dirt-cheap price and unusual collection of features that includes editable text wraps and the ability to handle four-color separations. As such, we award it an honorable mention for entry-level desktop publishing. Why not give the package an Editors' Choice? Simply because PagePlus lacks the automation novices need and the powerful design or long-document-creation tools professionals must have.

Professional Desktop Publishing

BY LUISA SIMONE

Desktop publishing has traditionally involved a single designer who integrates a number of different source files containing text, tables, images, and charts, into a seamless document. This one-person-one-document approach to publishing requires a basic toolset that includes import filters, typographic controls, and layout functions.

The simple truth is that all four of the programs reviewed in this story—Corel Ventura, Version 4.2; FrameMaker for Windows, Version 4.0; PageMaker for Windows, Version 5.0a; and QuarkXPress for Windows, Version 3.3—deliver these core functions with power to spare. The similarities among these products include a price of less than \$1,000, the

ability to size Adobe Type 1 and TrueType fonts in increments of less than a point, defined styles, robust import and export filters, and text-flow functions that span multiple columns and noncontiguous pages.

The real news, of course, is that electronic publishing has outgrown both the physical limitations of a single desktop and the narrow focus on paper-based documents. Full-color projects require guaranteed color fidelity. Commercial and

workgroup publishing projects require multiple users to have access to a document at different stages of its creation. Government and enterprise-wide publishing projects require structured documents that are transportable both across platforms and between applications. CD-ROM and on-line publishing projects require sophisticated hypertext links and viewer utilities that can be distributed along with the document. In short, today's cutting-edge desktop publishing programs must integrate processes and people as well as they now integrate words and pictures.

COLOR PUBLISHING

An enormous amount of progress has been made in the four-color-separation process. Basic functions that were first developed by QuarkXPress on the Macintosh include the ability to import

Our Contributors: GAYLE C. EHRENMAN is an associate editor and JOHN MOORE is a staff editor of *PC Magazine*. BRENDON M. MACARAEG is an editorial researcher at *PC Magazine*. LORI GRUNIN and LUISA SIMONE are contributing editors of *PC Magazine*. JAMES KARNEY and DON LABRIOLA are frequent contributors to *PC Magazine*. LANCE ULANOFF was the associate editor in charge of this story, and JEFF MACE was the project leader.

The Marriage.



The new Lexmark WinWriter™ 600 is the brain-child of Lexmark and the Microsoft Corporation. Which simply means it offers all the ease of use you expect from Windows, and the unsurpassed speed and quality of a Lexmark printer.

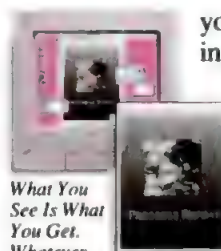
Because the WinWriter 600 was built from the ground up around Windows, you control everything from print quality to paper tray selection from your PC's screen, using a mouse. You'll never



your PC, just by pointing and clicking.

Control everything from print quality to paper tray selection from your PC, just by pointing and clicking.

have to get up to press little buttons on an LED control panel. In fact, the WinWriter 600 and



What You See Is What You Get. Whatever your screen displays will print quickly and precisely.

your PC talk to each other, allowing helpful messages to be displayed on your screen. For example, you'll immediately know when a paper tray is empty or when the toner cartridge needs to be replaced.

The WinWriter 600 is also extremely fast—up to 8 pages per minute at 600 dpi—because the Windows Printing System speaks the same language as Windows on your PC. It's also truly WYSIWYG, so anything on your screen prints exactly as displayed. Even the most compli-

The WinWriter 600 is made in the USA. The Energy Star emblem does not represent EPA endorsement of any product or service. Microsoft and the Windows logo are Lexmark International, Inc. ©1994 Lexmark International, Inc.

THE NEW WINWRITER 600

The Offspring.



Announcing the WinWriter 600 laser printer for Windows.



**MICROSOFT
AT WORK.**

ated graphics and scanned photos will print quickly and precisely.

Your PC and the WinWriter 600 work together so closely that if you get a faster PC, it's like getting a faster printer. The WinWriter 600 will always be compatible with future releases of Windows, too. So it has the advantage of built-in investment protection.

It's also easy to print from DOS because the WinWriter 600 switches automatically from Windows to DOS whenever needed.

The WinWriter 600 makes it hard for Windows users to tell where their PC ends and their printer begins.



The WinWriter 600 comes to you from Lexmark, an independent world-wide company formed from a division of IBM. To learn more, call 1 800 358-5835, ext. 400.



The WinWriter 600 and Windows aren't just compatible. They're perfect for each other.

LEXMARK™

Make Your Mark

registered trademarks and Windows, Microsoft At Work and the Microsoft At Work logo are trademarks of Microsoft Corporation. Lexmark and WinWriter are trademarks of

CIRCLE 100 ON READER SERVICE CARD

L A S E R P R I N T E R F O R W I N D O W S .

HIGHLIGHTS

Desktop Publishing Software

NOT EVERY USER HAS the same desktop publishing needs. Just as you wouldn't use a business-level product to publish a four-color magazine, it would be equally inappropriate to buy a high-end package to produce a simple newsletter or greeting card. Today's desktop publishing software vendors, such as Microsoft and Quark, have worked hard in the past few years to add features to their DTP packages that will better address their core audiences.

PRICE IS THE MOST obvious delimiter between the high and low ends of the desktop publishing market, with some professional-level products costing ten times as much as business-level packages. On the other hand, PagePlus for Windows' dirt-cheap price doesn't necessarily equal only \$50 dollars worth of functionality.

QUARKXPRESS PROVED TO BE the most powerful designer of all the professional-level products we tested. Its ability to manipulate a complicated array of text and graphics to create highly designed documents makes it the champion for magazine-quality publications.

THE INCLUSION OF THE EfiColor XTension is the most valuable addition to QuarkXPress. EfiColor can translate between color models, allowing QuarkXPress to produce four-color separations directly from

RGB images and even indicating colors that are not supported by your printer.

FRAMEMAKER'S STRENGTH in handling long documents and technical publications makes it attractive to publishing professionals who are more concerned with power than with the ability to create highly designed publications.

BUSINESS-LEVEL desktop publishing products are blurring the boundaries between the entry- and professional-level markets. Packages such as Microsoft Publisher and PagePlus offer some of the power and flexibility traditionally associated with high-end offerings.

MICROSOFT PUBLISHER'S powerful features and its emphasis on ease of use make it appealing to both novices and experienced desktop publishers. The program provides enough automation to get the novice user up and running quickly, while more experienced users can take over as much of the process as they wish.

NOT ALL ENTRY-LEVEL desktop publishers have the same needs or level of proficiency. Because of this, business users should pay particularly close attention to a product's depth of features and level of automation when determining which package will best suit their needs.

preseparated CMYK images in either the EPS/DCS or TIFF format and to convert named RGB colors to their CMYK equivalents. Since last year's desktop publishing roundup, both FrameMaker and PageMaker have acquired these capabilities.

Once again, QuarkXPress has pushed the envelope by incorporating a third-party color utility, called the EfiColor XTension, into Version 3.3. At the core of EfiColor are the CIE LAB device-inde-

pendent color model and device-specific color profiles for monitors, scanners, and printers. When translating among the color spaces of different devices, such as the RGB color space of a monitor and the CMYK color space of an offset printer, EfiColor maps all values back to the CIE LAB color space.

Theoretically, this system provides accurate color matches throughout the entire production cycle and prevents you from choosing colors that are

beyond the gamut of your final printing device. In reality, and much like all other current color-matching systems, it only works if you have the correct color profiles for your particular hardware and if your application programs can produce MCT (Metric Color Tag) headers that identify the device profile that was used to create a picture in the first place. For example, EfiColor must be informed that you are importing a preseparated TIFF image that was generated according to SWOP (Standard Web Offset Press) specifications if it is to provide an accurate color translation for screen previews or proofs on a standard color laser printer.

You can also expect to see competition from the largest and most successful traditional color-matching system: Pantone. For years, the Pantone Matching System has provided a paper-based swatch booklet for choosing colors and formulas for mixing spot-color solid inks. Although most graphics software packages include a Pantone palette, they do so using application-specific technology. As a result, matching the colors you see on-screen at print time has been nearly an impossible task. The Pantone Open Color Environment (POCE), a joint venture between Pantone and LightSource Computer Images, promises to deliver an accurate electronic version of Pantone colors as well as LightSource's Ofoto engine to match scanned color photographs across these devices.

On a broader level, there is a serious push to relieve desktop publishing programs of color-matching responsibilities by providing system-level capabilities. In fact, Adobe, Agfa, Apple, Kodak, Microsoft, Silicon Graphics, and Sun have announced their intentions to do just that via the ColorSync Profile Consortium. This multivendor group will develop a cross-platform solution that provides color consistency on Macs, PCs, and graphics workstations.

The ColorSync Consortium will also place the specifications for device profiles into the public domain. In much the same way that TWAIN-compliant devices and PostScript Printer Description (PPD) files have brought scanning and optimized halftoning to a wide variety of graphics applications, the ColorSync

If price were
no object,
you'd probably
go for a
Digital PC.

You could look it up.

According to a recent survey,* people are willing to pay extra for Digital PCs. They're that good.

We're flattered. But the truth is, you don't have to lay out big bucks to get Digital quality. Quite the contrary.

You can now get three of the best desktops that money can buy. For a lot less than anyone might expect.

These machines—including our new green model—start at just \$1,348. You can even get a PC with a *true* Pentium™ processor for just \$2,798. And that's with monitor.

DECpc LPx 433sx

- i486™ SX/33MHz
- 4MB RAM
- 170MB IDE hard drive
- 14" SVGA 1024i color monitor
- S3™ 805 graphics accelerator
- 6 slots (2 VESA-VL, 4 ISA)

\$1,597 \$36/mo. lease

True Pentium™ processor

DECpc LPx 560

- Pentium 60MHz processor
- Call for specs

\$2,798 \$97/mo. lease

So go.

The DECpc LPv+ 425sx saves you money even in its sleep. We reengineered what *PC Week*® magazine called "one of the 12 best products of 1993" to do a lot more...and use a lot less juice, to boot.

All DECpc LPv+ 425sx models come with such power features as a GUI accelerator,

170 to 340MB hard drive and a LIF socket for quick chip upgrades.

Yet the DECpc LPv+ 425sx uses less than 30 watts in sleep mode—well below EPA Energy Star standards, not to mention how much it can save you on electric bills.

The DECpc LPx 433sx is a value-priced box that won't constantly



remind you of it. Because it delivers Windows™ workstation speed, power and expandability—in spades.

This machine zips along at a nice 33MHz clip. Its 4MB memory is expandable to a hefty 64MB, and comes with two VESA-VL local bus slots as well as four ISA slots.

The DECpc LPx 560 is a true 60MHz Pentium processor desktop at the price of a mere i486™ processor PC. Just \$2,798.

Plus, it includes three ISA, two PCI and one interleaved slot for plenty



of expansion options. Sure, you could pay more for all this Pentium technology—but why would you want to?

So how can we offer made-by-Digital quality at made-by-who prices? Not by cutting corners, certainly. All

three models are engineered by the same folks who build our big-ticket items: Us.

Which is why we back them with the same comprehensive warranty* we offer on all our PCs.



So what are you waiting for? Call the number below for any Digital PC you want on this or the next page.

DECpc LPv+ 425sx

- i486 SX/25MHz
- 4MB RAM
- 170MB IDE hard drive
- 14" SVGA 1024i color monitor
- S3 805 graphics accelerator



\$1,348 \$47/mo. lease

You've always wanted to say, "money is no object." Now you can. Without paying the price.

1 800 669-4811

Please reference **BXL** when you call.
8:30 a.m. to 8:00 p.m., Mon.–Fri. ET. Call us for ordering information or the name of your local Digital dealer.

digital™
PC
Beyond the box.

*The Wall Street Journal, October 15, 1993—McKinsey & Co. and Intelliquist Inc.
†December 27, 1993
‡Three-year limited hardware warranty. Certain restrictions and exclusions apply.
Warranty service on PC notebooks is return-to-factory. Monitors, batteries and peripherals covered by a one-year warranty.

Name your specs. We've got a PC to fit them.

NOTEBOOKS

Modular notebooks that let you upgrade processors, disk drives, screens and more.

NEW!



25MHz i486 SE (mono) **\$1,699**
25MHz i486 SE (color) **\$2,399**
Lease for as low as \$59/month

4MB RAM (expandable to 20MB)
120MB hard drive
1 PCMCIA Type I, II or III slot

3.5" floppy drive
8KB cache
MS-DOS® and Windows™
Embedded numeric keypad
NiMH battery
Advanced power management
AC adapter

33MHz i486 SLC Premium (color) **\$4,199**
Lease for as low as \$146/month

4MB RAM (expandable to 32MB)
200MB removable hard drive
1 PCMCIA Type III slot, or 2 Type I or Type II slots

LPv+ SYSTEMS

Energy Star compliant systems.

NEW!



25MHz i486 SX **\$1,348**
33MHz i486 SX **\$1,448**
33MHz i486 DX **\$1,698**
50MHz i486 DX2 **\$1,798**
66MHz i486 DX2 **\$2,098**
Lease for as low as \$47/month

Local bus SVGA video
GUI accelerator
4MB RAM (expandable to 64MB)
S3™ 805 1MB graphics accelerator
170MB hard drive
3 ISA slots
4 drive bays

OverDrive™ processor upgrade
3.5" floppy drive
14" SVGA(i) color monitor
MS-DOS and Windows
Mouse
101-key keyboard
Energy Star compliant

LPx SYSTEMS

Value-priced performance and expandability



33MHz i486 SX **\$1,597**
33MHz i486 DX **\$1,847**
50MHz i486 DX2 **\$1,947**
66MHz i486 DX2 **\$2,247**
— NEW! Call for specs —
60MHz Pentium chip **\$2,798**

Lease for as low as \$56/month

VESA-VL bus GUI accelerator
4MB RAM (expandable to 64MB)
S3 805 1MB graphics accelerator
170MB hard drive
6 slots (2 VESA-VL, 4 ISA)
5 drive bays

Pentium™ OverDrive™ processor upgrade
3.5" floppy drive
14" SVGA(i) color monitor
MS-DOS and Windows
Mouse
101-key keyboard

XL SYSTEMS

Pentium processor upgradable, with PCI local bus

NEW!



33MHz i486 DX **\$2,549**
66MHz i486 DX2 **\$2,649**
60MHz Pentium chip **\$3,199**
66MHz Pentium chip **\$3,499**
Lease for as low as \$88/month

8MB RAM (expandable to 192MB onboard)
340MB SCSI hard drive
3.5" 1.44MB floppy drive
S3™ 928 PCI graphics accelerator
1MB video RAM (expandable to 2MB)
Double-speed SCSI CD-ROM*
15" SVGA, LE, NI color monitor*

6 slots (2 PCI, 3 ISA, 1 ISA/PCI interleaved)
128/256KB cache
5 drive bays
Onboard PCI SCSI-II
MS-DOS and Windows
Upgradable to Pentium OverDrive and full Pentium processors

*Optional. Not included in price.



1 800 669-4811

Please reference BXL when you call. 8:30 a.m. to 8:00 p.m. ET, Mon.-Fri.
Call us for ordering information or the name of your local Digital reseller.

digital
PC

Beyond the box.

© DIGITAL EQUIPMENT CORPORATION, 1994. The DIGITAL logo and DECpc are trademarks of the Digital Equipment Corporation. Beyond the Box is a service mark of the Digital Equipment Corporation. OverDrive, Pentium and i486 are trademarks, and the Intel Inside logo is a registered trademark of Intel Corporation. S3 is a trademark of S3 Corporation. Windows is a trademark and MS-DOS is a registered trademark of Microsoft Corporation. Digital believes that the information in this advertisement is accurate as of its publication date; such information is subject to change without notice. Digital is not responsible for any errors. Actual monitor may differ from that shown. Not all products available worldwide.

A DTP Continuum

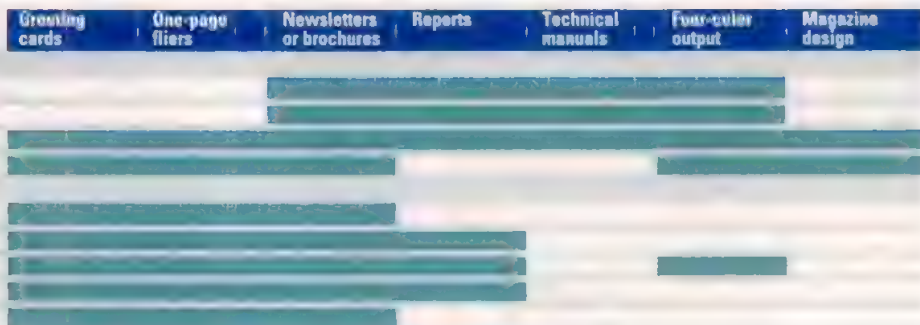
■ —The product is intended for this use
□ —The product is not ideally suited for this use

PROFESSIONAL-LEVEL PACKAGES

Corel Ventura for Windows
FrameMaker for Windows
PageMaker for Windows
QuarkXPress for Windows

ENTRY-LEVEL PACKAGES

CompuWorks Publisher for Windows
Microsoft Publisher
PagePlus for Windows
PFS: Publisher
Publish It! for Windows



What's most interesting about the above diagram is that not even our Editors' Choice-winning products can appropriately cover every segment of users' needs. Nonetheless, that is what differentiates desktop publishing from so many other software product categories. Users may say they need a

desktop publisher, but that doesn't necessarily mean they need QuarkXPress.

The one product able to span the continuum is PageMaker. Unfortunately, it does not handle all areas with equal ability.

It is important to remember that

these bars do not represent a product's proficiency at producing a particular type of document; there are no value judgments here. Instead, the bars simply show whether or not the product is intended to create, say, a greeting card or a four-color magazine such as *PC Magazine*.—LU

specifications will allow any hardware vendor to write a profile and any software vendor to utilize it. Indeed, Pantone has already announced that POCE will be able to utilize ColorSync profiles.

ELECTRONIC PUBLISHING

The issue of open standards versus proprietary systems is also at the core of electronic and transportable documents. On one end of the spectrum is Frame Technology Corp.'s proprietary approach, which allows you to create on-line documents and read them with FrameViewer, an ancillary utility program that costs \$49 for a single copy (volume discounts are available). FrameMaker and FrameViewer form a powerful combination that offers hypertext links, search and retrieval functions, and a customizable interface. The advantage of this closed system is that a FrameMaker document needs no special postprocessing (just a variation of the Save As command) to become an on-line FrameViewer document.

At the other end of the spectrum is SGML (Standard Generalized Markup Language), which promotes the easy transfer of documents among platforms

and applications. Indeed, the SGML file format contains nothing more than plain text, links to nontext material, and a description of the document's structure. Although the professional-level desktop publishing market is moving toward SGML compliance, the pace is slow.

Frame Technology already offers a proprietary structured document-creation program that is available on Macintosh, Unix, and Windows platforms: the \$1,495 *FrameBuilder*. Though it does not rely upon native SGML code, *FrameBuilder* documents can be easily converted to SGML via third-party products such as *Avalanche FastTAG*. Frame Technology has demonstrated its commitment to SGML with a Unix-based SGML Toolkit and has announced plans for similar functionality under Windows. Though all desktop publishing vendors are interested in SGML, at the moment neither Aldus, Corel, nor Quark have announced plans for SGML-compliant products or extensions.

The current version of Corel Ventura takes the middle ground on the issue of electronic publishing by providing rudimentary support for Adobe Acrobat. Though Acrobat cannot be described as an open system, it is built upon the PostScript Page Description Language and so benefits from the ubiquitous support of PostScript among desktop publishing programs.

An enormous amount of progress has been made in the four-color-separation process by all the major vendors.

WORKGROUP PUBLISHING

There is little doubt that workgroup publishing is the future of desktop publishing. It encompasses the traditional commercial publishing paradigm,

in which writers, editors, art directors, illustrators, layout artists, and production managers all perform highly specialized tasks in a more-or-less sequential order. Workgroup publishing also includes the concept of live documents with which multiple authors can share data and documents in real time.

The soon-to-be-released Quark Publishing System and the more-distant Metro system from Aldus both promise to

Performance Tests: Desktop Publishing Software

How We Tested

PC Magazine Labs' testing found that you may want to make your desktop publishing buying decision based on two things: your degree of experience and the tasks you wish to accomplish. Our testing revealed a clear division between professional- and entry-level software.

Some desktop publishing packages are clearly suited for business or home-office publishing, while the others are divided between professional color publishing and long-document creation.

When we tested professional-level DTP packages, our test script focused on professional color production and long document creation. We tested the entry-level packages by concentrating on newsletter production, report generation, and a black-and-white greeting card design.

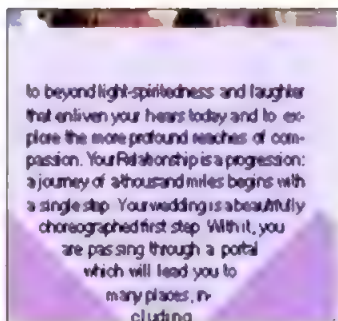
For the professional color production portion of our testing, we created a two-page spread (pictured at right). This layout contained elements a graphic designer would expect to design with a product capable of producing professional four-color output on a Standard Web Offset Press.

Our spread required each package to format text to precise typographical specifications. We flowed 10-point type with 10.5-point leading into linked text columns. If a color-matching system was available, we applied several process colors to the backgrounds, shading, and text. We also placed text in our triangular-shaped text

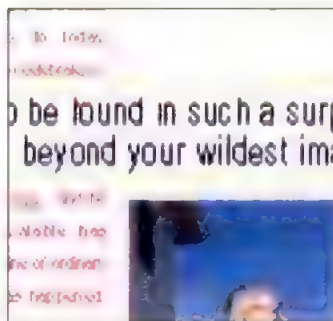
placeholders as callouts. We sprinkled a bold display font throughout the design, which had a 5-point baseline



Our original design, created in QuarkXPress, Version 3.2 for the Macintosh, was processed in CMYK format and adheres to the same level of typographical specification required by a professional graphic design house.



PageMaker could not create irregularly shaped text frames without workarounds.



QuarkXPress's EfiColor Xtension helped us match screen colors with final output.

event their packages could not handle the Photo CD images.

The headline type, which extends into the image, and the imported .EPS file of the red ampersand would require an overprint in postproduction (as seen below), which allowed us to test the trapping capabilities of each package. All of the fonts we used were part of the Monotype Classic Fonts Library by Monotype Typography. We printed proofs on a Tektronix Phaser II SDX and an Iris SmartJet 4012, then trans-

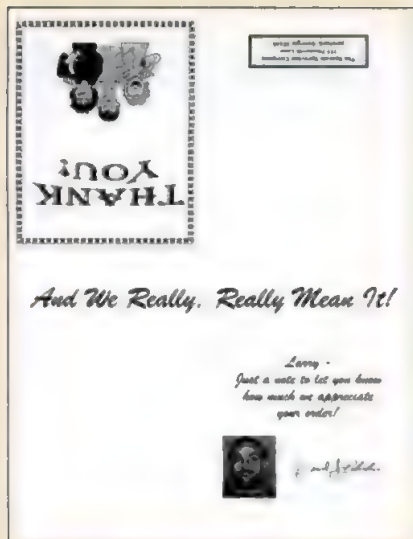
ported the image files with the PLI Infinity 88/RW44.

Marla Milne, a free-lance graphic designer based in New York City, designed the two-page spread and created it on a Macintosh running QuarkXPress, Version 3.2. The photographs were shot by The Photographer, based in Boulder, Colorado.

For our long document creation task, we imported mathematical symbols from a statistical package, a

.DBF file, and an RTF file from a fictitious, enterprise-wide information database. We designed this task to determine how well each package could import and export files and apply a common structure to a publication.

The document required running headers and footers, as well as the generation of an index, table of contents, and footnotes. We tested each DTP product's ability to read style-tagged text, as well as its prowess in automatically applying and converting text and paragraph styles. Also, a document had to include an imported graphic anchored to specific locations. We



Microsoft Publisher properly rotates the text and prints guidelines wherever the page should be folded.

then evaluated each package's ability to import and export SGML (Standard Generalized Markup Language) files.

The entry-level products faced three tasks. First, we created a business newsletter by using all the tips and tricks offered by each product to create a business newsletter. The two-page, two-column brochure for black-and-white output to a laser printer contained a scanned .PCX image. Using fonts supplied with the package, we created a headline and italicized readouts. Next, we focused on report generation by designing a marketing report for a fictitious company. We evaluated how well the packages could import Microsoft Excel spreadsheet data and a CGM chart.

We also tested each product's ability to create a greeting card using its own clip art. This task also required output to a laser printer. We compared how each program handled this complex page setup, which included a four-way fold with different elements in each quadrant, some at 90-degree rotations to allow for the single-page printing of a folded card.—*Analysis written by Jeff Mace*

track files across a network and control workflow (for more information, see the sidebar "A Group Publishing Effort"). But until these technologies are in place, many users are creating workarounds for workgroup publishing.

It is really too early to tell which programs will ultimately provide the best workgroup solutions. At the moment it seems PageMaker and QuarkXPress will pursue the commercial publishers, while enterprise-wide publishing systems are much more likely to come from companies like Frame Technology or Interleaf that specialize in long, structured documents. (For more information on Interleaf, see the sidebar "... And Then There's Interleaf.") These products already offer several important features, including conditional text and the ability to compare different versions of a document.

FINAL EVALUATIONS

The nature of our testing procedures polarizes these professional-level products into two camps. On the one hand, the flexible layout tools and floating palettes that encourage artistic tweaking make PageMaker and QuarkXPress perfect for design-intensive documents. On the other hand, FrameMaker and Corel Ventura offer high-level structuring conventions for text variables, cross references, and automated numbering schemes that are more suited to long, complex publications.

It is important to remember, however, that these evaluations do not consider the expandability of each product. QuarkX-Tensions and Aldus Additions, for example, add database-publishing functions to their respective programs. Now that Ventura is part of the Corel family of products, you can expect to see a common user interface and cross-program functionality for both Corel Ventura and CorelDRAW.

Once you've taken the first step toward expandability and interoperability, it's not so difficult to make the leap to the customized applications and integrated systems offered by Frame Technology and Interleaf. Only you can

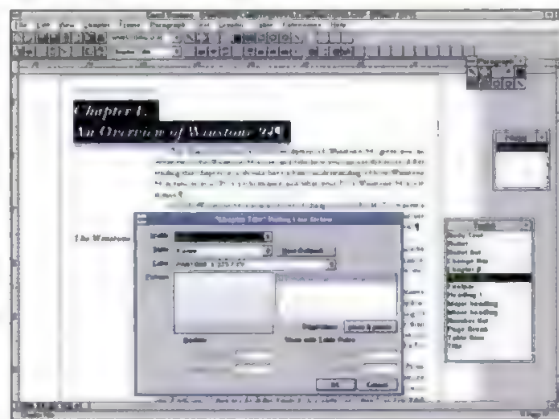
decide where your publishing projects and your budget place you on the continuum. But whether you are looking for an off-the-shelf publishing solution or a totally customized publishing front end, the products you'll find in these reviews are up to the task.

Corel Corp.

Corel Ventura

BY LORI GRUNIN

You might be lulled into thinking that Corel Ventura, Version 4.2, with its low list price of \$249 and with a CD-ROM version priced at a mere \$199, is a bargain. After all, it offers many of the same professional-level document-publishing features as FrameMaker at only a fraction of the price. But by the time you have scaled the learning curve and settled into a working rhythm with the product, you'll have learned a valuable lesson about the hidden costs imposed by a



Corel Ventura automatically offers a series of predefined tints for each color choice in your palette to provide full color control in your publications.

poorly designed interface.

Corel has not yet made many changes to its recently acquired product. Most visibly, the product now ships with Corel Database Publisher (formerly Ventura Database Publisher), a fairly robust query-and-tagging engine for the creation of data-driven documents. If you purchase the CD-ROM version, you also get a disk full of fonts and clip art.

A more subtle addition is support for Adobe Acrobat's PDF Mark operator, which allows Acrobat to translate a publication's table of contents information into

Suitability to Task: Professional-Level Desktop Publishing Software

If you're designing a book, you'll need a desktop publishing tool intended for long document creation. On the other hand, the graphic designer who is copy-fitting text to coordinate with a graphic has significantly different needs. It would be nice to generate a complicated table of contents *and* rotate a CMYK TIFF file within the same package, but you can't; not yet, at least.

We rate each package with two scores for performance: *power* and *ease of use*. Power refers to the wealth and strength of features offered to solve a given task, while ease of use addresses the way each package implements those features. We measure a feature's usability by how difficult it is to learn, and we consider its flexibility under real-world conditions.

To score an excellent power rating for the **highly designed page layout** task, a product must provide a wide variety of features essential to combining graphical and textual elements. A product must offer controls to coordinate the relationship of these elements down to 1/10th of a point, as well as config-

SUITABILITY TO TASK

Product Name	POWER		EASE	
Highly designed page layout	Poor		Excellent	
Text and typography	Fair		Good	
Color handling	Good		Fair	
Long document creation	Excellent		Poor	

urable text-wrap features for irregularly shaped graphics. We look for a package to handle a variety of page-setup tasks, such as snap-to grids and guidelines, and global page options. We also look for features to help manage font and picture implementation, as well as tools aimed at readying the final document for output at a service bureau. Products that offer fine controls for picture handling, such as the ability to rotate an image within the picture block, receive high marks. In terms of font handling, we rate a package's power based on how much control it provides for setting type styles to exact specifications for color and special effects. We evaluate ease of use scores based on the simplicity and grace the product offers the end user in terms of creating and fine-tuning a final design.

In looking at control over **text and typography**, we focus on the ability to shift the baseline up or

down per letter or word without affecting the leading on other characters sharing the same line. The ability to adjust kerned pairs and to apply tracking and fine letterspace adjustments increases a package's chance of receiving a high rating. To rate excellent in ease of use demands a variety of keyboard equivalents for easy access to all text controls.

We award high ratings for **color handling** to packages that can work in CMYK mode, import color palettes, and control trapping for output. Products that provide no support for a color-matching system or the ability to print spot- or four-color separations receive lower ratings. We evaluate ease of use in this category based on the level of automation and control a package offers the user.

To score well in the **long document creation** task, a package must support footnotes and generate a table of contents and a multilevel index. Offering an extensive list of filters for different word processors, spreadsheets, and databases counts in a product's favor. Offering options for text import also contributes favorably to a product's score. In judging a product's ease of use, we look for automation and flexibility in anchoring imported graphics to a paragraph, and importing filters and tagged style formatting for a variety of text formats.

hypertext links; Ventura also supports the conversion of hidden text into Acrobat notes. Although Ventura ships with the Acrobat Reader, you must separately purchase Acrobat Exchange or Distiller (software that turns any document or PostScript file into a cross-platform electronic format). Because of a glitch of unknown origin, you need to renumber and regenerate the table of contents and index twice in order to get the publication to paginate correctly when creating an Acrobat document.

SOMETHING OLD, SOMETHING OLDER

Aside from those enhancements, Ventura remains the same venerable old workhorse. It's no accident that after all these years the program names its main working directory Typeset: At heart, Ventura is still a typesetting and composition engine based around tagged ASCII text.

You create a chapter by adding frames

to pages and loading text files or graphics into them; neither text nor graphics physically reside in the file. For example, if you paste a graphic in from another application, Ventura prompts you to enter a Ventura .VPO filename, under which it will save that graphic. And rather than import text files as other products do, Ventura actually converts the linked file into tagged ASCII. A Microsoft Word for Windows document, for example, may retain its binary encoding, but when you open it in its native application, all the formatting has been replaced with Ventura's style tags.

Even if you delete a frame, the linked file remains associated with the chapter. So unlike other packages, in which you might move frames around to change the layout of text blocks on a page, Ventura makes it faster just to disassociate the text from one frame and reassociate it with another.

THE LONG OF IT

This metaphor works fairly well for generating long documents, technical publications, and multichapter books. Ventura offers a good variety of numbering tools, including ten levels of paragraph numbering, as well as chapter-and-number figure numbering and chapter- and-section page numbering. Generating a table of contents is a simple process comparable with that of other products, but indexing, though powerful, is needlessly tedious.

Ventura also offers the requisite supply of high-end typographical controls, including vertical justification, baseline shift, and interactive kerning and tracking. Similarly, color handling operates much the same way as in the competition, though you cannot apply colors from an on-screen palette, and constantly selecting tints can prove frustrating, because all tints appear unlabeled in the drop-down list box.

Despite the inclusion of Ventura Separator, a very good color-separation module, you don't want to use Ventura for even moderately taxing layouts. It

SUITABILITY TO TASK

Corel Ventura	POWER		EASE	
Highly designed page layout	Fair		Poor	
Text and typography	Good		Good	
Color handling	Good		Fair	
Long document creation	Good		Good	

Killer Pixels

- 105 Million Winmarks†
- 1280x1024 in 16.7M colors

Introducing the

GRAPHICS PRO TURBO™



ATI's GRAPHICS PRO TURBO unleashes hordes of killer pixels that will turn

your PC into an amazing hive of graphics activity. Stirred up by our *mach64*, 64-bit accelerator chip, your applications will be swarming across the screen at speeds of over 100 million Winmarks*. And your DOS applications will run faster than ever before.

True Killer Color

ATI's deadly new strain of pixels is not only fast, it's vibrantly colored as well, with accelerated 24-bit true color that never stops working, even at resolutions as high as 1280x1024. GRAPHICS PRO TURBO runs in 16.7 million colors as fast as other cards do in just 256.

Wilder Windows

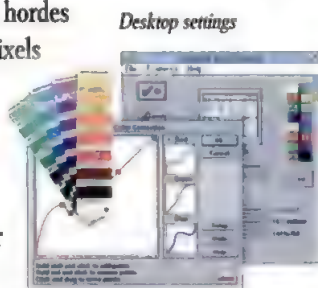
GRAPHICS PRO TURBO has a real buzz

for Windows users too, with acres of virtual desktop and flicker-free graphics at up to 100Hz refresh.

Exclusive software handles color calibration, and our unique WinSwitch lets you change color and resolution modes without restarting Windows.

Plus, the GRAPHICS PRO TURBO makes full-motion video really hum with no additional multimedia hardware. So don't bee stung by lesser graphics.

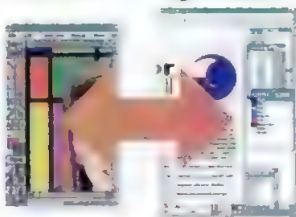
Get the GRAPHICS PRO TURBO. It's a honey of a card.



Color calibration

Easy control of desktop settings and color calibration with FlexDesk panel.

True Color + High Resolution



WinSwitch changes color and resolution... without leaving Windows.

COMPLETE PERFORMANCE DATA (Larger numbers are better)

	ATI	Matrox MGA	Diamond Viper
PCBench 3.11	104.5	88.6	78.1
PCBench 3.0	36.2	28.0	20.0
Motion Video	25.7	12.1	4.6
PCBench 3.11 (1024x768)	4,428	575	1,662
PCBench 3.11 (1280x1024)	24	11	13

GRAPHICS PRO TURBO outperforms other accelerators.

GRAPHICS PRO TURBO

- 2MB (upgradable) or 4MB VRAM memory
- ISA, VESA and PCI Local Bus versions
- Dynamic monitor control and adjustment
- Drivers for OS/2, CAD, DOS and more
- Energy efficient, Green PC support
- 5 yr. warranty
- Priced** at \$599 (2MB) and \$899 (4MB)



ATI TECHNOLOGIES INC.

33 Commerce Valley Drive East
Thornhill, Ontario, Canada L3T 7N6
Telephone: (905) 882-2600 ext. 4111
Facsimile: (905) 882-2620
CompuServe: GO ATITECH 76004,3656

FAX
(905) 882-2600
FOR LITERATURE
BY FAX
DOC #1030



SEE US AT WINDOWS WORLD BOOTH #6922

* All performance tests done on a Pentium 66MHz, 16MB RAM, 256K cache, 200MB HD at 60Hz, using 2MB versions of PCI graphics cards. † Winbench 3.11 at 1024x768 resolution in 256 colors. †† VGA performance tested using PCBench 3.0 (video harmonic) ††† Motion Video performance measured under Windows using 65K colors. Test clip recorded at 320x240 at 30 fps using Indeo codec.

©Copyright ATI Technologies Inc., 1994. ATI, *mach64*, GRAPHICS PRO TURBO, and WinSwitch are trademarks and/or registered trademarks of ATI Technologies Inc. All other company and/or product names are trademarks and/or registered trademarks of their respective manufacturers. Features and specifications are subject to change without notice. Product may not be available exactly as described or shown.

**Suggested U.S. retail prices, dealers may sell for less.

FACT FILE

Corel Ventura, Version 4.2

Corel Corp., 1600 Carling Ave., Ottawa, Ontario, Canada K1T 8R7; 800-836-3729, 613-728-8200; fax, 613-761-9176

List price: \$249.

Requires: 4MB RAM (6MB with Ventura Separator), 14MB hard disk space, Microsoft Windows 3.1.

In short: Current Ventura users may benefit from upgrading to the new but not very much improved Corel version of the product. Potential new users should adopt a wait-and-see attitude toward this long-document publishing veteran, however.

485 ON READER SERVICE CARD

WHERE IT LIVES

Ventura's major drawback, however, is that it has never adapted very well to living under Microsoft Windows. The most annoying artifact from the GEM era is the Width tables. They were originally designed to allow the product to match font metrics for a nonlocal printer, a function long since taken over by such products as Adobe Type Manager and Bitstream's FaceLift. Width tables now control Ventura's access to fonts; if you haven't loaded a font into the current width table, Ventura doesn't know the font exists. Nor does the interface comply to Windows standards. As well as being illogically organized, its keyboard shortcuts are not mnemonically designed.

Once you know the product fairly well, however, the navigation quirks don't really impede your work. Instead, the selector tools become the real bottleneck to productivity. Ventura has three: one for selecting objects and frames, one for paragraphs, and one for text. If you have selected a paragraph with the paragraph selector, you can't delete it; you must

select it using the text tool. If you've selected text with the text tool, you can't remove a linked file from the file list; you must activate the frame tool, since Remove Text/File is under the Frame menu.

Nor can you select text across pages. Combined with the one-open-chapter-at-a-time desktop, this limitation made breaking up our long document into smaller chapters impossible within Ventura; we had to do so from within our word processor. And Ventura's inability to convert Word for Windows stylesheets into tags meant we had to retag the entire publication.

Corel will be including an updated version of Ventura in its forthcoming CorelDRAW 5.0 package. Its enhancements should include irregular text wrap, better rotation, full-style translation for Word for Windows and WordPerfect documents, SGML support, and improved publication-management tools. With an improved interface and a rewrite of the currently frustrating documentation, Ventura may yet be resuscitated.

doesn't support text wrap around irregularly shaped graphics, in-line graphics, nonrectangular frames, spreads (although it does support facing pages), or bleeds. The only alignment tools are the rulers and an *invisible* grid—no guides. In the end, producing an acceptable approximation of our test spread proved exceptionally frustrating.

SEE TO IT THAT THE PRINTER YOU CHOOSE TO

Insist upon a printer with genuine Adobe® PostScript™ software inside. It's the industry standard and the only way to guarantee that your printer will work with virtually every software application and hardware environment, today and tomorrow. Adobe PostScript software sets the standard for new color and network printers. In fact, leading printer manufacturers offer over 300 Adobe PostScript printers. Adobe PostScript is your assurance of the highest-quality output—every time—whether you're printing from DOS, Windows®, OS/2®, Macintosh®, or UNIX®. So if



SET YOUR SIGHTS ON GENUINE ADOBE POSTSCRIPT DEVICES:

Frame Technology Corp.

FrameMaker for Windows

BY JAMES KARNEY

Publishers who create long, complex documents will find that FrameMaker for Windows, Version 4.0, is built to go the distance. This \$895 package from Frame Technology Corp. has all the power tools needed to create and manage complex structured technical publications. And in addition to designing a more intuitive user interface, the company has improved the program's color-control and document-management capabilities.

Most users who rely on this program don't care about design-intensive advertising layouts. FrameMaker was not designed with these in mind, so don't expect all of the fancy design and interactive layout tools found in programs such as QuarkXPress. FrameMaker's real strength lies in its ability to create complex documents such as technical manuals which contain long text elements, dia-

grams, graphics, and multiple references to text and objects scattered throughout the publication.

FrameMaker provides a host of features not found in other high-end packages, including conditional text, support for complex footnotes, headers and footers, and convoluted number schemes both for sections of a book and for individual paragraphs. This program can also enforce structured formatting, automatically format styles globally, and even correctly reduce mathematical equations. The latest version has the ability to rotate both text and graphic elements in 0.001-degree increments; improved table, header, and footer editors; and a new Page Layout palette.

BETTER DESIGN

Previous versions of FrameMaker were hard to master because of the program's deeply nested dialog boxes. Though Version 4.0 of FrameMaker applies the same tag/stylesheets approach of older versions to formatting text, the menus and dialog boxes are better organized and aug-

mented with the QuickAccess bar, a word processor-like button bar for executing many commands. A new formatting ruler provides access to pop-up menus for line spacing, defining paragraph formats, setting tabs, and managing text alignment. If you don't like a menu's layout, you can change it with the program's configuration files. For finicky users, a C-based API (application programming interface) is available that allows you to add customized extensions to the product.

Although FrameMaker could not

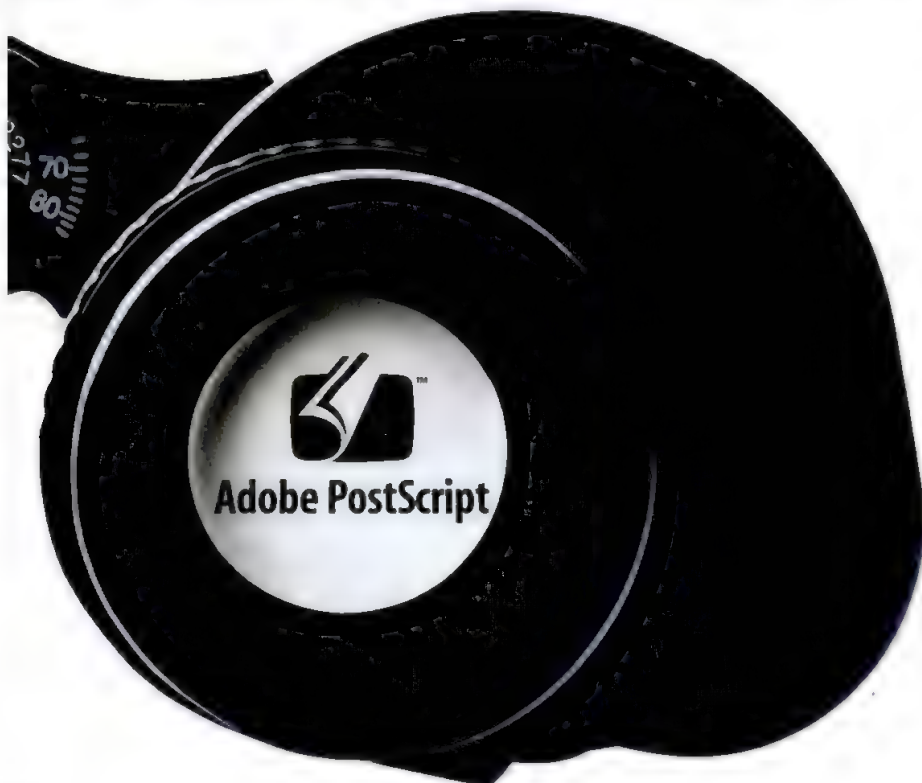
SUITABILITY TO TASK

FrameMaker for Windows

	POWER	EASE
Highly designed page layout	Fair	Fair
Text and typography	Excellent	Good
Color handling	Good	Good
Long document creation	Excellent	Excellent

complete some of the tasks in the design-intensive portion of our tests, the program is capable of producing attractive pages. We were able to duplicate many of the

DAY IS THE PRINTER YOU'LL USE TOMORROW.



you're anyone from a small business owner to a professional publisher, an Adobe PostScript printer is the best long term value for your company, today and tomorrow. For a free guide on how to choose a printer, call 1-800-833-6687, Dept D, Ext. 1406.



It's NOT JUST PRINTING,
IT'S **ADOBE POSTSCRIPT** PRINTING.

Adobe, the Adobe logo, PostScript, the PostScript logo and the tagline, "It's not just printing, it's Adobe PostScript printing" are trademarks of Adobe Systems Incorporated which may be registered in certain jurisdictions. All other marks and trademarks are the property of their respective companies. ©1994 Adobe Systems Incorporated. All rights reserved.

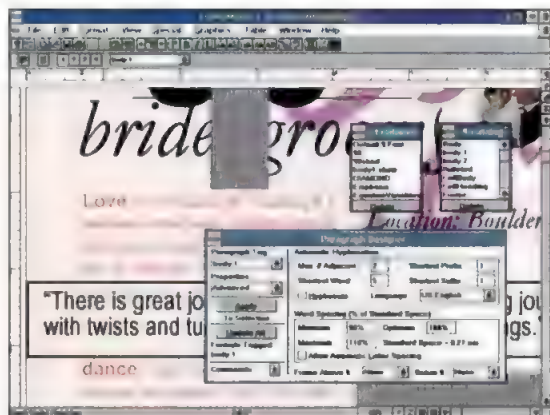
CIRCLE 368 ON READER SERVICE CARD

BLACK-AND-WHITE, COLOR, NETWORK AND FAX PRINTERS.

Desktop Publishing Software

effects automated in QuarkXPress and PageMaker using manual workarounds. However, FrameMaker couldn't handle the transparent effects and special effects for text.

Frame Technology has upgraded



FrameMaker for Windows' detailed paragraph-design dialog box gives you complete control over the text layout in your publication.

FrameMaker's color handling from the paltry 8-spot color array of earlier versions, though the upgrade is still not at the level of most of the other high-end products in this roundup. The upgrade supports four models: CMYK, HLS, Pantone, and RGB. FrameMaker can also produce four-color separations with any PostScript-compatible printer.

GOING LONG

As expected, FrameMaker shone when it came to the long-document phase of our evaluations. The import filters held all the details and placement of our test document, including headers, footers, and equations. Styles, including advanced typographic controls, can be set for sections of a publication, paragraphs, and even characters. Inserting fancy footnotes, working with multiple languages, and any other book-publishing task is accomplished without bother.

FrameMaker offered us a wealth of tools for creating the styles for our long documents. FrameMaker allows precise control of global attributes at several levels. Master pages allowed us to specify global parameters and paragraph tags and to control complex formatting, which we were able to apply to all paragraphs of a given type or to just a single instance. We could also define specific style tags that could be used to for-

mat a text string within a paragraph. Variables, those defined by us and by the program, were used to manage headers and footers, and FrameMaker offered us extensive controls for footnote indexing, auto numbering, and document division into sections and subsections.

FrameMaker offers the best cross-platform support of any desktop publishing program. Files can be exchanged among Macintosh, Windows, and Unix platforms, and the interface is almost identical throughout. Also, Version 4.0 and Version 3.0 files are interchangeable. In addition, the program supports network file locking.

The new FrameBuilder offers the ability to design and enforce formatting based on structured rules. A template similar to the Document Type Definitions (DTD) used in the Standardized

General Markup Language (SGML) provides a roadmap for analyzing and managing a publication's structure. Frame is planning on using FrameBuilder as part of its approach to supporting SGML publishing and enterprise-wide on-line information systems.

DOCUMENT MANAGEMENT

FrameMaker now also offers some strong document-management tools. You can generate a detailed comparison between two documents, including a revision list showing all changes, along with a statisti-

cal summary that includes word count. The revised portions are joined by hypertext links that can be used for editorial navigation. When used with the condition-text feature, this can be a handy tool for creating multiple versions of a publication.

FrameMaker provides exceptional on-line document tools for a product in this price range. You can embed hypertext links and hypermedia objects in any file. FrameReader 3.0, an \$89 add-on, lets you view documents without having to use the main program. While FrameReader won't let you edit documents, you can use it to print or display all or part of a FrameMaker publication. Together with FrameMaker's ability to reference outside files, all necessary tools are provided for producing on-demand electronic publishing.

FrameMaker for Windows, Version 4.0, is the most powerful PC-based collection of electronic publishing tools for handling long, complex documents and providing true cross-platform support. While it lacks the design-intensive prowess of QuarkXPress, it will prove a real workhorse for anyone who produces technical or other types of structured publications.

Aldus Corp.

PageMaker for Windows

BY LORI GRUNIN

Quality is in the details, and ultimately the details—not the features—render Aldus Corp.'s PageMaker for Windows, Version 5.0a, inferior to QuarkXPress and FrameMaker when it comes to creating either highly designed layouts or long, complex documents. On the other hand, PageMaker's adequate abilities make it the only product versatile enough to create a document both of reasonable length and also of attractive design.

Unlike frame-based desktop publishing packages, text and graphics float on PageMaker's pasteboard. This is a speedy way to work; rather than performing the two-step process of defining a container and then filling it, you simply place elements directly on the page in a single step. These elements can remain as linked files, or you can sever the links and store them within a PageMaker .PM5 file.

While the core architecture of the product remains unchanged between the

FACT FILE

FrameMaker for Windows, Version 4.0

Frame Technology Corp., 1010 Rincon Circle, San Jose, CA 95131; 800-843-7263, 408-433-3311; fax, 408-433-1928

List price: \$895

Requires: 6MB RAM, 10MB hard disk space, Microsoft Windows 3.1.

In short: FrameMaker for Windows, Version 4.0, is the weapon of choice for long-document production and cross-platform support. This latest version combines a more intuitive interface, more networking features, and far stronger color support than in the last edition.

ON READER SERVICE CARD

We Scan Corrected.



You expect a scanned image to accurately reflect the color found in your original. Getting there, however, is usually no picnic. After scanning, precious hours are often spent adjusting the image in software to capture the truest blue, a faithful fuchsia, or for example, just the right kind of red in a ripe watermelon. But DCR™ has changed all that.

Now, when you purchase the **new, low-priced ScanMaker® IISp single-pass color scanner**, you also get **DCR, Dynamic Color Rendition**, an advanced, yet easy-to-use color calibration and correction system.

DCR actually calibrates the ScanMaker IISp to a photographic industry-accepted calibration target, creating a custom color profile of your

specific scanner, ensuring the most accurate color possible as you scan the image. But don't take our word for it. Here's what *PC Magazine* said in their February 8, 1994 issue: "...this mechanism (DCR) seems to have worked well, because the ScanMaker IISp's color output was clearly the best of any scanner in our survey."

So, even if you need to capture the bright yellow flesh of a Honeyheart watermelon, like the wedge on the left, the quickest way to do it is with the new ScanMaker IISp with DCR.

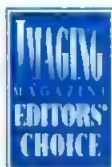
For more information about the ScanMaker IISp, DCR, your nearest authorized Microtek reseller, or a **FREE** copy of *The Scanned Image* — a scanning primer, call **1-800-654-4160** or fax (310) 297-5050.



The ScanMaker IISp accurately captures millions of brilliant colors at resolutions up to 1200 x 1200 dpi through software interpolation (300 x 600 dpi optically). In addition to the DCR color calibration/correction system, the ScanMaker IISp is bundled with Adobe Photoshop 2.5 LE for either Windows or Macintosh. Windows users also get Caere's PageKeeper Portfolio document and image management software.



Microtek ScanMaker IISp



Get a hands-on demonstration of the ScanMaker IISp with DCR and find out more about accurate color scanning by attending Focus Seminars' "ColorRight, Color Correction & Reproduction Workshop." For dates and locations, call Microtek at 1-800-654-4160.

MICROTEK
Better Images Through Innovation.

The DCR color calibration / correction system is a proprietary system of Microtek Lab, Inc. The following are trademarks or registered trademarks of their respective companies: Microtek, ScanMaker and DCR (Dynamic Color Rendition) of Microtek Lab, Inc. Adobe Photoshop LE of Adobe Systems, Inc. PageKeeper Portfolio of Caere Corporation. SMILSP294

CIRCLE 091 ON READER SERVICE CARD

■... And Then There's Interleaf

By Don Labriola

High-end desktop publishing systems may pack a lot of power, but even the best fall short when faced with truly large publishing applications. Industries such as aerospace and pharmaceuticals routinely spawn documents that run hundreds of thousands of pages and involve dozens of authors, artists, and incompatible computer systems scattered around the world. Conventional DTP software simply isn't equipped to handle such requirements, but that doesn't mean the situation is hopeless.

With more than 250,000 installations under its belt, Interleaf, an advanced document-processing software package from Interleaf (617-290-4990), has distinguished itself by solving just these types of problems. The latest version, Interleaf 6, currently runs on Unix workstations and minicomputers; support for Microsoft Windows and Windows NT is due to ship this summer. Pricing for the Windows version wasn't available at press time, but the package is expected to sell for \$995 for a

single-user license.

Unlike conventional DTP software, which provides tools for tailoring static page layouts, Interleaf 6 lets users



Interleaf 6 has workflow-management features that can automatically route publications through a development team.

define processes that generate documentation automatically. Interleaf 6 documents interact with authors and system resources through user-definable dialog boxes and programming-language interfaces. Documents also

redefine themselves on the fly whenever their operating environment changes or their contents are revised. For example, they can automatically

restructure themselves when user security levels change, or radically alter their appearance to accommodate different output media.

ACCESS TO EVERYTHING

Interleaf 6 for Windows is fully object-oriented, and the documents it creates store their logic in objects called components, which resemble intelligent versions of the tags and styles found in conventional DTP packages. Easy-to-use utilities provide access to more than 200

publishing-oriented functions, which users can embed into these components. Interleaf 6 also includes robust interfaces to programming languages such as C++ and Microsoft Visual Basic, as well as a built-in LISP (List

previous and current versions, Aldus has augmented the product with two important productivity enhancements. The first, Aldus Additions, allows developers to add tools to PageMaker (à la QuarkX-

Tensions) and also provides scripting support so that users can automate repetitive or difficult tasks.

As with QuarkXPress, many of PageMaker's strengths surfaced during the creation of our two-page test spread. Fine-tuning the letter spacing in the headline, for example, was simply a matter of highlighting the text and using the cursor keys to experiment with distances in 1/100 em increments.

Similarly, choosing colors and setting traps are among the product's strengths. Among other tools, for example, PageMaker has a keylining Addition, called "Control keyline", which applies an outline in a user-specified weight and color around graphics. PageMaker

also adds the colors used in EPS graphics to the active color palette; you can also create libraries of colors, which you then access via the same drop-down list as in Pantone, TrueMatch, and other color schemes. A QuarkXPress-like Library palette lets you store named and keyworded sets of frequently used elements.

THE REAL TEST

On the other hand, the recreation of some elements required far more work, and in some instances, PageMaker was simply unable to duplicate QuarkXPress's design capabilities. For example, cropping the trio of portraits into circles—which PageMaker does not support—took trial, error, and calculation to determine a line weight and circle size that would yield the proper crop size and cover the edges of the rectangular images. We then overlaid the circle, which bore the same color as the



PageMaker for Windows' variety of color-matching systems includes TrueMatch and Pantone's PMS, which can be used to create color libraries.

Processing) interpreter that adds another 2,000 functions.

This approach gives Interleaf 6 far more flexibility than other types of publishing software. Most DTP packages, for example, force users to position each graphics file on a specific page manually, a technique that quickly becomes cumbersome when you have documents that contain thousands of illustrations. An Interleaf 6 component, on the other hand, could easily be programmed to place a figure in the upper-right quadrant of the page following the paragraph that describes it; if that paragraph moves 500 pages, the graphic would follow it automatically.

Interleaf 6 is even more powerful in a networked environment, where it can coordinate distributed publishing efforts that encompass a variety of hardware platforms. Its Active Link and DBLink tools give documents dynamic access to text, graphics, and database records maintained on remote PCs, Macintoshes, workstations, minicomputers, and mainframes—even if those objects are stored in proprietary file formats. Dozens of drawing programs, bitmap editors, spreadsheets, database man-

agers, presentation-graphics packages, and word processors are supported, as well as industry standards such as PostScript, SGML, and SQL.

Interleaf 6 also excels in the more mundane DTP tasks. It doesn't have quite the word processing and page-layout horsepower of PageMaker or QuarkXPress, but it's on the same track. A surprisingly accessible GUI conforms closely to Windows 3.1 and NT conventions and even includes much of Chicago's anticipated look and feel.

Interleaf 6 offers hundreds of other sophisticated features, such as automated audit trails, high-end prepress and color separation functions, technical illustration and bitmap-editing programs, and a full-blown WYSIWYG word processor. But simply listing its features misses the point—Interleaf 6 for Windows, with its emphasis on distributing publishing processes in a networked environment, is as different from other DTP packages as they are from old-style word processors. If you're faced with generating massive, highly volatile documents in a heterogeneous workgroup environment, there's nothing else quite like Interleaf 6. □

page, on top of the images.

The one effect we could not reproduce in any way was the diamond-shaped callout. PageMaker supports irregular text

SUITABILITY TO TASK

PageMaker for Windows

	POWER	EASE
Highly designed page layout	Good	Good
Text and typography	Excellent	Excellent
Color handling	Good	Excellent
Long document creation	Good	Good

wrap around an object, but it can't wrap text around another text block; no amount of tinkering allowed us to simulate the effect.

THE LONG OF IT

For generating long, complex documents, PageMaker is no FrameMaker. However,

it imported our test files with only a few glitches. Its RTF (Rich Text Format) filter fared much better than its Word for Windows filter, which, for example, lost an entire table.

Because it brings documents in as a single text block, PageMaker loses section breaks; fixing this or breaking a single long document into separate publications (for assembly as a book) can be incredibly tedious. Nor does PageMaker support footnotes; they disappear entirely. However, the program properly retains all text formatting. It's a breeze to generate a table of contents in PageMaker. The program selects entries based on an "Include in table of contents" checkbox in the Paragraph specifications dialog. Thus, table-of-contents entries can be defined as part of a style, as well as overridden for individual topics, and you can easily create lists of figures

or other specialty items.

In the same vein, indexing is a relatively painless process. While you can manually traverse the document to insert index markers for up to three index levels plus cross references, you can also use the search-and-replace function in the Story editor (a more convenient word processor-like window for working with text) for quick-and-dirty marker insertion.

BINDING

As with Corel Ventura and FrameMaker, PageMaker assembles separate publications into a book, complete with book-wide indexing, table of contents, and page numbering. The program's weakness in long, complex document creation surfaces in tasks such as section- and page-numbering, figure placement, footnotes and endnotes, and running headers and footers. Although you can restart page numbering with each publication in a book, PageMaker doesn't support vari-

PageMaker for Windows, Version 5.0a

Aldus Corp., 411 First Ave. South, Seattle, WA 98104; 206-622-5500, 800-333-2538; fax, 206-343-3360

List price: \$895

Requires: 4MB RAM, 8MB hard disk space, Microsoft Windows 3.1, high-resolution graphics card

In short: While this veteran lacks the power of any of its individual competitors for specialized tasks, this version of PageMaker offers a good combination of tools for creating both sophisticated page layouts and structured documents

ON-READER SERVICE CARD

able text for page, section, or paragraph numbering.

One Addition lets you generate running headers and footers that lift user-specified text from the publication based on paragraph style. For example, you can tell it to place on every right-hand page a header composed of the first two words from the last paragraph formatted with Heading 1. But the Addition physically runs through each page of the publication while you watch, placing a text block on each page where appropriate. This is not

A Group Publishing Effort

By Lance Ulanoff

When we last looked at desktop publishing, the term "workgroup publishing" indicated a product's ability to share a document across multiple platforms. But today, the concept is shifting. While none of the products we review here have anything near a fully realized group publishing system in the box, the term "groupware" is one that users will soon be seeing applied to some of their favorite DTP systems.

Interleaf 6 doesn't really consider itself a traditional desktop publishing system (for more information, see the sidebar "...And Then There's Interleaf"). The folks at Interleaf prefer the phrase "Electronic Publishing System." However, their product currently provides one of the best models for how group document creation could occur. It features tools for all facets of document creation,

including text-editing and design. It also features workgroup-publishing tools, which includes shared style sheets, automatic updates for all instances of a placed graphic, revision tracking, document distribution, and multiple-user access of a single document.

The ability to open a single document in multiple locations and have multiple users work on it at the same time is one of the goals of Quark's new Quark Publishing System (QPS). Currently available only for the Macintosh, QPS includes three modules to help produce a highly designed publication. The first is the QuarkDispatch XTension, which makes QuarkXPress "QPS-aware."

QuarkDispatch is actually a collection of programs that includes Server, Administrator, Planner, and File Manager. Users can connect to

QuarkDispatch (see below) and check OPS documents in and out. This is followed by an editing module called QuarkCopyDesk. Users can write and edit articles, insert nonprinting notes, view word and line counts, and display layouts as they appear in QuarkXPress. PC versions for most of these modules are expected sometime later this year.

Aldus Corp., on the other hand, does not yet have a workgroup solution. And instead of building a workgroup publishing tool designed specifically for PageMaker, Aldus is busy building a set of workflow technologies code named "Metro" and "Toucan." Designed for use in small publishing and design houses, these tools will manage the flow of documents throughout the office and will maintain projects in folders called "job-bags." □

a true running head, merely a clunky approximation.

PageMaker's support for running headers and footers actually serves as a good example of a general fundamental flaw in the product. Many of the important new features incorporated into the product are Additions, including such basic tools as drop caps, bullets and numbering, grouping, and page sorting. Most of these Additions are implemented poorly. All of them appear on a single menu; "Expert kerning" does not belong in the same place as "Acquire image." There are a few exceptions, however, such as the Printer styles feature, which lets you define custom printer configurations and batch-print unopened publications.

For now, PageMaker 5.0 is in many ways better than its predecessor. While it lacks its competitors' fluidity for performing specialized layout tasks or complex document publishing, it still offers the best combination of features for the middle-of-the-road tasks that comprise the bulk of high-end corporate publishing,

Quark Inc.

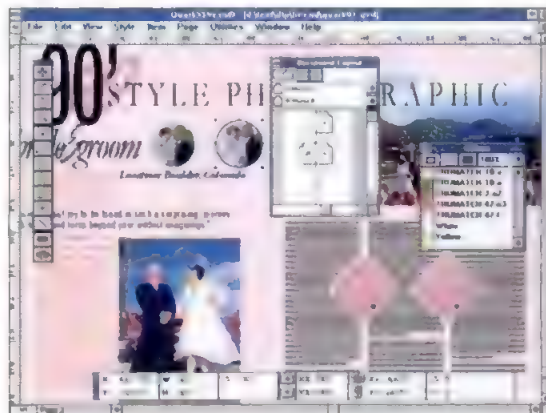
QuarkXPress for Windows

BY LUISA SIMONE

When we first reviewed QuarkXPress for Windows last year, we found it to be a robust design tool with very little need for improvement. The latest version of this \$895 program heeds the adage "Don't fix what ain't broke." So you'll find the same precision tools that let you spec type in 1/1000-point increments, adjust tracking by 1/20,000th of an em, and rotate objects by 1/1000th of a degree. Likewise, QuarkXPress for Windows, Version 3.3, sports the same seven floating palettes that give you instant access to document layout controls, formatting options, and libraries of frequently used elements. Indeed, though unchanged, many of Quark's original tools—such as grouping,

alignment, and locking functions—remain superior to anything the competition has to offer.

The big news in QuarkXPress, Version 3.3, is the inclusion of the EfiColor Xtension, the brainchild of Electronics for Imaging (EFI). EfiColor promises to bring color fidelity to the desktop environment. This is accomplished by mapping device-dependent color spaces (such



This complex layout is a relatively trivial task for QuarkXPress's precise and easy-to-access Measurement palette (bottom).

Flexibility (ˌflek·sə·'bil·ət·ē) *n.* 1, A feature previously not found in this category. *example:* For under \$800, **TI microWriter™** printers give you the *flexibility* to start with **Adobe® PostScript®** or add it later; the comparable HP 4L does not.



**THE
UNDER \$800
PRINTER,
REDEFINED.**

If you're looking for a printer with a street price well under \$800*, you'll have a hard time finding one with as many features as a TI microWriter.

Let's compare it to our leading competitor, HP, starting with basic models. First, take flexibility. Ours lets you add PostScript now or later. With the HP 4L you can't add it at all. Take paper handling. Ours comes with a 250-sheet tray standard, theirs with just a 100-sheet. Speed? We give you 5 ppm, they give you 4. Yet in spite of all this, we still list for hundreds of dollars less.

Now, let's compare high end models. As you'll see from the chart, the features here are basically comparable—till you get to price.

And once again, the TI microWriter is clearly the better value.

In fact, we're so confident you'll like it, we'll even give you our 30-day satisfaction guarantee. For more information or a dealer near you, call **1-800-TI TEXAS (1-800-848-3927)**.

	TI microWriter Basic		HP 4L	TI microWriter PS23		HP 4ML
<i>Print Speed</i>	5 ppm		4 ppm	5 ppm		4 ppm
<i>PostScript</i>	Upgradeable		No	Standard		Standard
<i>Paper Trays</i>	(std.)	250 sheet	100 sheet	250 sheet	100 sheet	
	(opt.)	250 sheet	Not Avail.	250 sheet	Not Avail.	
<i>List Price</i>	\$599		\$849	\$799		\$1279

**EXTENDING YOUR REACH
WITH INNOVATION™**

 **TEXAS
INSTRUMENTS**



Specifications in chart are based on information as of 2/94. *Estimated dealer price. Dealer prices will vary. microWriter and "Extending Your Reach With Innovation" are trademarks of Texas Instruments. Adobe, PostScript and the PostScript logo are registered trademarks of Adobe Systems, Inc. © 1994 TI.

CIRCLE 304 ON READER SERVICE CARD

Illustration Software for DTP

By John Moore

Sometimes you *can* find a product that covers all the bases. If you're an artist who often only creates newsletters, brochures, and other short publications, you probably don't want a professional illustration program and separate desktop publishing software. With this in mind, illustration software vendors are implementing more desktop-publishing functions into their programs.

All of the packages discussed here are capable of importing text from several word processors and wrapping text around irregularly shaped objects. They also feature other basic desktop-publishing functions such as leading, kerning, and spell-checking. Of course, deciding which package's features are strong enough for you depends on how much you'll be working with text.

The next version of Aldus FreeHand, which will provide automation for creating columns, rows, and tables, should have both the depth of features and the flexibility to rival some low-end DTP packages. Linking text to the next column will simply be a matter

of dragging the Link box at the bottom of a text block to the next column.

Wrapping text around graphics in FreeHand will be equally simple: You'll just click the Text Wrap icon and enter the standoff distances. FreeHand will also feature automatic copy-fitting to reduce or enlarge text by a specified percentage to fill a column. Extras such as hanging punctuation, editing text along a path, and a rich selection of special effects should make FreeHand the best choice if you're looking to do desktop publishing within your illustration package.

Gold Disk's Professional Draw, Version 2.0, which is scheduled to ship in the second quarter of this year, will also boast some decent DTP capabilities, though not quite as strong as those expected in FreeHand. For example, there will be no way to create columns automatically. Setting the gutter width by using the

Snap Guides will provide a certain level of automation, but you will still have to link text manually to separate blocks.

Professional Draw's graphical approach to kerning text should appeal



Included in Micrografx Designer's DTP capabilities is complete control over character spacing and drop caps. However, you can't flow text to a different page.

as the colors of your monitor, scanner, and printer) to the much larger and device-independent CIE LAB color model. EfiColor thus provides three benefits: First, it gives you a better shot at producing consistent color across different devices; second, it alerts you to colors that are out of the gamut for your chosen printer; and third, because it can translate between color models, EfiColor allows QuarkXPress to produce four-color separations directly from RGB photographic pictures.

BETTER THAN EVER

EfiColor does have its shortcomings. Remember that the EfiColor system is only as good as the profile you use. If the generic or common profiles that ship with Quark don't match your particular hardware configuration, you will have to purchase additional profiles from EFI (call

800-285-4565 for EFI profile information) or live with less-than-perfect color translations.

Quark's other numerous improvements build upon already present functions. The Document Layout palette for

SUITABILITY TO TASK		
QuarkXPress		
	POWER	EASE
Highly designed page layout	Excellent	Excellent
Text and typography	Excellent	Excellent
Color handling	Excellent	Good
Long document creation	Fair	Fair

example, has been streamlined for easier creation and management of up to 127 master pages. For example, you can now instantly reformat a page by dragging a master page icon to a document page icon. Text boxes can now accommodate

to inexperienced desktop publishers. Selecting Reshape Characters from the Type menu will place a handle in front of each character, which will allow you

an even wider range of design needs because they can be shaped just like picture boxes. In fact, the diamond-shaped text boxes in the PC Labs test document were downright easy to create with the new editable polygon text boxes.

Importing a wide variety of picture formats into the high-end test document was a snap because of Quark's new picture-import features. Not only does Version 3.3 include JPEG and PhotoCD filters, it also includes a thumbnail preview of the image and valuable technical information (such as color model and compression scheme) about the file.

Despite the complexity of our design-intensive document, none of the tasks were beyond QuarkXPress's capabilities. The exact positioning and sizing of elements in relation to one another, for example, was often simply a matter of performing math functions (addition, sub-

to drag and move individual characters.

Not surprisingly, the fully packed CorelDRAW, Version 4.0, offers several basic desktop publishing features, including an option for creating up to eight columns per page. Even better, your imported text is automatically placed in the specified number of columns. CorelDRAW also boasts options that fit text to a path and align text to the baseline, as well as a thesaurus and automatic hyphenation.

But CorelDRAW isn't the speediest program or the easiest to use in terms of handling text with graphics. That should change in Version 5.0, however, which will include an updated version of Corel Ventura, the company's desktop publishing package.

DTP DRAW

Both Adobe Illustrator for Windows, Version 4.02, and Deneba Software's Canvas for Windows, Version 3.5, provide some adequate desktop publishing tools, although they are not as strong or intuitive as they could be. Flowing text between columns is no problem, but you can't create columns automatically. And while Illustrator will make the new column the exact dimensions as the original, Canvas

forces you to select the Text tool, point to where you want the left margin placed, and drag the pointer diagonally to where the right margin should be to create a bounding rectangle. This is not a completely inconvenient way in which to create columns, but it does require the user and not the program to be accurate, and it can become tiresome if you are creating a multipage publication.

One advantage Illustrator has over other packages is its 18- by 18-inch drawing board, which can fit up to four pages on one board. Flowing text to different pages is no problem in this package. The next version of Illustrator is expected to feature OLE and TrueType support.

Micrografx Designer, Version 4.0, would be counted among the programs offering the best DTP functions if not for one serious drawback: You can flow text to a different column, but not to a different page. This is more than a minor annoyance for anyone who needs to create a multipage document. However, Designer is the only package in which you can create drop caps. It also features a dictionary and an option for creating a custom dictionary. □

traction, multiplication, and division) in the Measurement palette. And creating the various traps was as easy as defining a global relationship between named colors.

QUARK EXTENDED

Straight out of the box, QuarkXPress does not have the functions to create long, complex documents. If you want to import .XLS or .WK* files directly, publish a database, link publication files into a book, create a table of contents, insert conditional headers, or generate an index you'll have to buy one of the many QuarkXTensions on the market. (For more information on QuarkXTensions, call the XChange at 800-788-7557.) However, with a 2,000-page-per-document limit, QuarkXPress is still capable of producing book-sized, highly designed publications.

The PC Magazine Labs testing script included creating a long, complex docu-

ment by importing a Word for Windows file. Within its limitations, QuarkXPress performed flawlessly. So while anchored graphics appeared in the proper location and typographic formats were maintained, page breaks (which are not part of QuarkXPress's defined styles) were ignored. Reestablishing the proper page breaks for this 118-page document required manually resizing the text frames to force breaks.

The program also lacks built-in networking functions. While QuarkXPress does lock files, it will not allow users to share document or template files across a network. On the other hand, sharing elements is now a little easier, thanks to Version 3.3's more stable support of OLE 1.0.

PRO DESIGN

Of course, professional publishers are not interested in hit-or-miss individual fea-

tures; they want an integrated environment for true workgroup publishing. For that, we'll all have to wait for the Quark Publishing System to move to Windows. The good news is that the wait should be fairly short: Quark is planning to release two essential modules of the Publishing System by mid-1994: QuarkCopyDesk and the QuarkDispatch XTension (for more information, see the sidebar "A Group Publishing Effort").

HARD COPY

The first release of QuarkXPress for Windows concentrated on PostScript rather than PCL support. The large installed base of HP-compatible printers in corporate environments has encouraged Quark to improve PCL printing support. Now, when you print a bitmap to a non-PostScript printer, Quark will print at the resolution of the output device, rather than dumping a screen resolution image as it did in the past. Unfortunately, special text effects—such as rotated text—will still require a PostScript printer for high-resolution output.

QuarkXPress has staked out the high-end of the desktop publishing market with design tools that can't be beat. Corporate and technical publishers will either have to purchase XTensions or look to competing products for document management and automated formatting functions. But art directors who want total creative freedom will find no better product on the market.

	FACT FILE
	QuarkXPress for Windows, Version 3.3
	Quark Inc., 1800 Grant St., Denver, CO 80203; 800-788-7835; fax, 303-894-3399
	List price: \$895 Requires: 4MB RAM, 6MB hard disk space, Microsoft Windows 3.1. In short: A consummate design program for professional art directors, QuarkXPress still offers the most precise and most flexible tools for creating design-intensive publications. The EfiColor XTension, when used with the proper device profiles, can increase efficiency and improve color fidelity.
	ON READER SERVICE CARD

More

More

\$1,699* (IBM Credit Lease
\$61 mo. **)

Now — want to carry off color with ease? Then call us about the ThinkPad 350C. You get a 9.2" backlit, 256-color, passive-matrix LCD display. There's plenty of power for your current needs. And ample space to upgrade for more. All in an easy-to-take 5.7-pound package. Both of these lightweights get the heavyweight backing of IBM's HelpWare™, including a 30-day moneyback guarantee and around-the-clock telephone assistance.* You'll find them at IBM PC Direct. To order these, or any of our other critically acclaimed IBM ThinkPads, call now.

[illegible]



ThinkPad 350C (color)

- 486SL, 25MHz processor with 8KB internal cache
- 4MB RAM/250MB hard drive, 3 5" 1 44MB diskette drive
- 11 7" w x 8 3" d x 2 0" h/5 7 lbs. with battery pack
 - 9 2" STN backlit LCD, 256-color display
- Full-size keyboard w/integrated TrackPoint II
 - PCMCIA slot
 - IBM DOS preinstalled
- 1-year international traveler's warranty

\$2,699* (IBM Credit Lease \$97/mo. **)

ThinkPad 350

- 486SL, 25MHz processor with 8KB internal cache
- 4MB RAM/125MB hard drive, 3.5" 1.44MB diskette drive
- 11.7" w x 8.3" d x 1.9" h / 5.2 lbs. with battery pack
- 9.5" monochrome STN backlit LCD display 64 grey scales
 - Full-size keyboard w/integrated TrackPoint II
 - PCMCIA slot
 - IBM DOS preinstalled
 - 1-year international traveler's warranty

\$1,899* (IBM Credit Lease
\$68/mo. **)

IBM PC Direct

*We're putting the personal
in personal computing.*

Order Now!

1 800 426-7396

8am-10pm M-F, EDT; 9am-5pm Sat., EDT



Purchase orders available for qualifying customers.

[illegible]

Entry-Level Desktop Publishing

BY JAMES KARNEY

From a professional printer's standpoint, it used to be easy to define low-end desktop publishing. All desktop publishing was low-end because it lacked the typographical and layout tools found on dedicated publishing systems. Today, virtually all professional publishing can be done with desktop programs, and the low end, which we refer to as entry-level, has become much harder to define.

Cost is the most obvious delimiter. The top-of-the-line applications list in the \$700-to-\$900 range and require serious hardware to operate at maximum performance. Many products in the entry-level market have street prices of under \$50 and can be run on entry-level

PCs. In a simple world, we could just compare price and features and then choose the best product.

Like professional publishers, however, not all novice users have the same needs or level of publishing skills, and not all vendors consider the same features important. The question is not simply a matter of how much the program costs. Users must also consider what they need, how much the program can do, and how easy the program is to learn and use.

The last time we reviewed entry-level desktop publishing software ("Personal Publishing Comes of Age," May 12, 1992) most packages were DOS applications. Each had its own interface, fonts,

and printer controls, and often had limited import filters. Some of them offered very limited features and could produce only simple designs. Others were relatively powerful but were cumbersome and difficult to learn.

Today, non-Windows packages are all but gone from the scene. Microsoft Windows makes it much easier for developers to create a workable, low-cost publishing program. It handles the fonts, display drivers, printer controls, and mouse support. Furthermore, functions such as cut, copy, and paste, along with better import filters, make simple work of adding text and graphics to a newsletter or brochure. We selected five products that are Windows-based, can handle Adobe Type 1 or True type fonts, and can produce multipage layouts.

TAKE TWO

There are two major trends in inexpensive desktop publishing programs: adding more publishing features and improving ease of use. Vendors looking to lure buyers are working on both. The

Suitability to Task: Entry-Level Desktop Publishing Software

The entry- or business-level desktop publishing software products are typically not designed for industrial-strength publishing output. As such, we tested them with the business and small-office user in mind. For every task, we apply two ratings: *power* and *ease of use*. Each task represents applications that are most applicable to this breed of desktop publishing software.

Power refers to the depth of features offered and the strength of the tools provided the user for solving a given task. The *ease of use* rating, on the other hand, addresses the way each package implements its features. Those who use this class of desktop publishing software typically employ other software products for their primary business needs. Thus, our tasks are designed to be completed easily by the occasional and, especially, novice user.

To excel at our **newsletter design** task, a product must provide a myriad of clip art and fonts and a method for managing them, along with prede-

SUITABILITY TO TASK		
Product Name		
	POWER	EASE
Newsletter design	Excellent	Poor
Specialty	Good	Fair
Business report generation	Fair	Good

fined style sheets or document-type templates to help the user get started. A package must also provide support for a wide range of popular graphics and word processor file formats. Concise text handling at the paragraph and word level, including control over font, size, leading, and justification are important here. In addition, we expect the best products to handle a number of automated special effects such as drop caps, shaded boxes, and shadowing. And obviously, the ability to print all imported and formatted elements as they appear on the screen is critical for a strong showing. In determining ease of use ratings, we look for products that offer predefined templates, master templates, and repeating frames.

Our **specialty** task tests each package's ability to produce a greeting card for multiple use in a small office. A high power rating means the product provides the ability to combine a variety of design formats, fonts, and graphics on the front, back, and

inside of a folded card. We determine whether a product excels in ease of use by looking for automation or heavy guidance for the proper placement of these items. For instance, products that receive an excellent rating in this area provide on-line help for choosing clip art, which might include a selection menu that features thumbnail images. Other ease of use features include assistance for text rotation and easy placement of scanned images. We also rate the products on how easy it is to customize the greeting card for different users. This is also an area in which we look at how suitable the application is for home use.

Business report generation demands that a package easily import database and spreadsheet files from a variety of data formats, including interchange formats used to move data between platforms, such as comma- and tab-delimited ASCII files. A high power rating in this area means that the product provides a method for formatting the incoming data and integrating it with text and graphics. Support for metafile and bitmap formats, including .BMP, .CGM, .TIFF, and .WMF, also helps raise a product's score.

We also look for options for positioning charts and for converting color charts to gray-scale images. In determining ease of use, we look at a package's ability to establish dynamic links with other applications.

TO HELP DEPLOY 66
COMMUNICATIONS SATELLITES,
MOTOROLA EMPLOYS
FRAMEMAKER.

Missions don't get much more critical than this. Motorola® is currently developing the IRIDIUM™ System, a massive cellular communications system involving a constellation of 66 satellites orbiting the earth. Equally critical is the massive amount of documentation required to get the IRIDIUM System off the ground. And naturally, Motorola selected the best tool for the job: FrameMaker®.  FrameMaker delivers exactly what Motorola needs for all their hardware and software documentation. The ability to easily integrate text, charts and graphics in long, structured

formats. On-line document distribution with hypertext capabilities for fast and easy access to technical information. And multiplatform capabilities for file compatibility across the PCs, Macintoshes, and UNIX workstations on site, as well as remote access from systems all over the world.  Now imagine what FrameMaker can do for your business. Call 1-800-U-4FRAME Ext. 604 today for our comprehensive Guide



To Document Publishing with FrameMaker 4. And see what FrameMaker can accomplish with your mission critical documents.  **Frame**

► **S U M M A R Y O F F E A T U R E S**

Desktop Publishing Software



Products listed in review order

■ = YES □ = NO

List price

General Features

Technical-support hours (eastern time)

Disk space required

Redo command

Simultaneous open documents

DDE support

OLE support

Document Layout

Maximum number of master pages per document

Maximum number of columns

Maximum page size (inches)

Maximum number of pages per document

Thumbnail display

User can reorder pages via thumbnails

User can rearrange pages

Section-and-page numbering scheme available

Alignment options:

Independent x and y rulers

Free-form guides

Can lock frames

Fonts and Typography

Font formats supported:

Adobe Type 1

Agfa Intelifont

Bitstream Speedo

HP cartridge fonts

TrueType

Supports embedding

Range of point sizes supported

User can adjust baseline

Ligatures/Automatic kerning

Text rotation

Fixed increments

User-defined values

User-definable tracking

Editable kerning and tracking tables

Automatic drop caps

Maximum number of characters/lines deep

Text Handling

Automatic bulleted/numbered lists

Conditional text

Character styles/Section styles

Vertical alignment and justification

Search-and-replace:

Nonprinting characters/Special characters

Named styles

Spell-checker/Table editor

Thesaurus

Text import:

DCA/RTF

Microsoft Word for Windows

PROFESSIONAL-LEVEL PACKAGES

Corel Ventura

FrameMaker for Windows

Aldus Pagemaker for Windows

QuarkXPress for Windows

ENTRY-LEVEL PACKAGES

CompuWorks Publisher for Windows

Microsoft Publisher

PagePlus for Windows

\$249.00

\$895.00

\$895.00

\$895.00

\$49.95

\$139.00

\$59.95

8:00-8:00 M-F

9:00-8:00 M-F

10:00-8:00 M-F

10:00-8:00 M-F

10:00-5:00 M-F

9:00-9:00 M-F

24 hours M-F, 9:00-7:00 Sat.

5MB

10MB

5MB

6MB

13MB

3MB

4.5MB

■

■

□

■

□

■

□

□

■

■

■

□

□

□

□

■

■

□

□

■

□

1.0 (client only)

1.0 (client, server)

1.0 (client only)

1.0 (client)

None

2.0 (client, server)

1.0 (client, server)

N/A

Unlimited

2

127

1

2

N/A

8

Unlimited

20

30

9

83

Unlimited

18 x 24

144 x 144

42 x 42

48 x 48

8.5 x 12

24 x 36

23 x 23

9,998

Unlimited

999

2,000

999

Unlimited

100

□

■

■

■

□

□

□

N/A

□

■

■

N/A

N/A

N/A

■

□

■

■

□

□

□

■

■

□

■

□

□

□

■

□

■

■

□

■

■

□

□

■

■

□

□

■

□

□

■

■

□

□

■

■

□

□

■

□

□

■

■

□

□

■

□

□

■

■

■

■

■

■

■

■

■

■

■

□

□

□

■

■

■

■

□

■

■

■

□

■

■

□

■

■

■

■

■

■

■

■

■

■

□

■

■

■

■

■

■

□

□

□

□

■

□

■

■

■

■

■

□

□

■

■

■

□

□

■

■

■

■

■

■

■

■

■

■

■

■

□

■

■

■

■

□

■

■

■

■

■

■

■

■

■

■

□

■

■

■

■

■

■

□

■

■

□

□

■

■

□

□

□

Desktop Publishing Software

CONTINUES

advances in professional-level products make us more aware of color, special design effects, and tools available to professionals. We want to be able to produce sharp-looking documents with a few mouse clicks and to have precise control over how elements are placed on a page. At the same time, most users don't want to spend several days practicing with a program and learning a lot about publishing just to get a job done.

PagePlus for Windows, Version 2.0, from Serif, is a fine example of a product that's reaching in both directions. It offers many of the features found in PageMaker and QuarkXPress, including color separations, the Pantone color palette, fancy text wraps and fills, and even a table editor. PagePlus may not

supply all the options of a high-end DTP package, but it does offer many of the controls at a level that will please the nonprofessional, and it does it at a fraction of the cost.

To use the full range of PagePlus's features requires time, but the user interface is easy enough to let the novice get a simple project out quickly. Each revision of the product has increased its list of features, and Serif seems to be aiming for a day when PagePlus can compete head-to-head with the major players.

Some power users may want every possible option, but not everyone needs such sophisticated software. Minute, incremental text positioning, color separations, and complex footnotes probably aren't necessary to create a two-page newsletter for a scout troop. Many people don't have color printers, fancy scanners, or the budget for elaborate press runs. They may have to output to dot matrix or ink jet printers. They just want to be able to get their jobs done with a minimum of fuss. Some vendors target this market by choosing a limited set of features and then work to make them as easy as possible to learn and use.

Microsoft Publisher is a good example of this kind of product. Rather than focus on how much the company can put in the box for the lowest price, Microsoft

is working on making the design process as foolproof as possible. Publisher includes Wizards, which are like design macros, and templates to automate the creation of documents. Once the basics are in place, the program allows the user to personalize the publication.

With more experience, you can take over as much of the process as desired. The concept is something like a point-and-shoot camera: You choose the basic options, let the program do the complicated parts, then customize the design. While this may sound a bit mechanical

for such an artistic endeavor, the results can be quite effective.

THE REST OF 'EM

Sandwiched between these two products are the other competitors. Each varies in terms of its power

and the elegance of its interface. Some packages have no color support, some handle text worse than others, and others import fewer graphics formats. All the products in this category, however, have a focus on the novice and part-time publisher in common.

Many of these programs come with some method for applying special effects to type, include decorative fonts and clip art, and offer style sheets and templates for common projects. There is a more subtle range of features and sophistication found in this area than in high-end products. In most cases, you can create an acceptable newsletter, business card, or ad without employing a second product to do part of the work. It may not be as polished as a publication created with a professional-level product, but you won't need an art degree to read the manual or adjust the dialog box settings, either.

The key to satisfaction when shopping for a bargain in desktop publishing software is knowing your specific needs, as well as your willingness to learn new publishing skills. Don't think of these products as scaled-down clones of the professional packages; each has its own personality. If you can find one that matches yours, it may save you both time and money.

*The key to satisfaction
when shopping for
bargain DTP software
is knowing your needs.*

PFS: Publisher	Publish It! for Windows
\$119.95	\$149.95
9:00-6:00 M-F	10:00-1:30, 2:30-6:00 M-F
8.5MB	3.5MB
☐	☐
☐	☐
1.0 (client only)	None
2	2
20	9
22 x 22	22.5 x 22.5
99	Unlimited
N/A	N/A
☐	☐
☐	☒
☒	☒
☒	☐
☒	☐
☒	☒
☐	☒
☒	☒
☒	☒
☒	☒
☐	☐
4-127	8-250
☐	☒
☐	☐
☐	☒
N/A	☐
N/A	☒
☐	☐
☐	☐
☒	☐
1.5	N/A
☐	☒
☐	☐
☐	☒
☐	☒
☐	☒
☐	☐
☒	☐
☐	☐
☒	☒
☒	☒

GRAPHICS

Desktop Publishing Software

SUMMARY OF FEATURES



Products listed in review order

■ = YES □ = NO

	PROFESSIONAL LEVEL PACKAGES				ENTRY-LEVEL PACKAGES		
	Corel Ventura	FrameMaker for Windows	Aldus PageMaker for Windows	QuarkXPress for Windows	CompuWorks Publisher for Windows	Microsoft Publisher	PagePlus for Windows
Text Handling (continued)							
Word wrap	■	■	■	■	■	■	■
Stylesheets for text manipulation	■	■	■	■	□	■	□
Data import:							
WK1/XLS	■	□	■	□	□	□	□
Equation editor	■	■	■	■	■	■	■
Text wrap	■	■	■	■	■	■	■
Around irregularly shaped graphics	□	□	■	■	■	■	■
Within nonrectangular frames	□	□	□	■	□	■	□
User can specify order	■	■	■	■	■	■	■
User-defined points	□	□	■	■	□	■	■
Graphics Handling							
Graphics file import:							
BMP (.BMP)	□	■	■	■	■	■	■
KPS	■	■	■	■	■	■	■
Editable (.AI)	□	□	□	■	□	■	□
PCX	■	■	■	■	■	■	■
Intel TIFF	■	■	■	■	■	■	■
WFO (WordPerfect Graphics)	■	■	■	■	■	■	■
Can write EPS files	■	■	■	■	□	□	■
Fill patterns	■	■	■	■	■	■	■
User-specified tints	■	□	■	■	■	□	■
Color models supported	CMYK, RGB	CMYK, HSB, RGB	CMYK, HSB, RGB	CMYK, HSB, RGB	None	RGB	Patterns
Drawing tools:							
Bezier curves	■	■	■	■	■	■	■
Polygons/Polylines	□	■	□	■	■	■	□
Unwarping	■	■	■	■	■	■	■
Flip/Mirror	□	■	■	■	■	■	□
Rotate	■	■	■	■	■	■	■
Bitmap editing	□	■	□	■	□	□	□
Output Support							
Process-color separation	■	■	■	■	□	□	■
Black generation	■	■	□	■	N/A	N/A	□
User can specify channel frequency and angle	■	■	■	■	N/A	N/A	■
Prints registration marks	■	■	■	■	N/A	N/A	■
Maximum number of spot colors	255	Unlimited	255	Unlimited	N/A	N/A	Unlimited
Can convert spot colors to CMYK	■	■	■	■	N/A	N/A	■
User can map to or from any color	■	■	■	■	N/A	N/A	■
Overprints/Knockouts	■	■	■	■	□	□	■
Prints negatives	■	■	■	■	■	■	■
Supports OPI	□	□	■	■	□	□	□
Reports font/page usage	□	■	■	■	■	■	■
Network and Platform Support							
File locking	■	■	■	■	N/A	□	□
User can share documents/templates	■	■	■	■	N/A	■	■
Other platforms supported	None	Macintosh, Sun	Macintosh	Macintosh	None	None	None
Network support:							
LAN Manager	■	■	□	■	N/A	■	□
Microsoft Windows for Workgroups	■	■	■	■	N/A	■	■
NetWare	■	■	■	■	N/A	■	■
Novell	■	■	■	■	N/A	■	■
Proprietary	□	■	□	□	N/A	□	□
Varying or flexible	■	■	■	■	N/A	■	■
Multiple use	□	■	□	□	N/A	□	□

N/A—Not applicable. The product does not have this feature.

ENDS

Wizardworks Inc.

CompuWorks Publisher for Windows

BY JAMES KARNEY

If you're a no-nonsense kind of person, then CompuWorks Publisher for Windows, Version 1.0, is the desktop publishing package for you. The \$49.95 program from Wizardworks is easy to use and has all the tools necessary to produce basic, short business publications such as flyers and newsletters. It isn't the most powerful or flexible program on the market, but the inexpensive CompuWorks Publisher is a good program for novice users who want to create short publications without having to spend a lot of time learning a professional-level product.

Based on a Corel Ventura-like frame metaphor, CompuWorks Publisher places every object on the page in a frame, with text formatted using paragraph styles. It supports most major word processors and maintains text-formatting options such as bold and italic. Fancy text-based design elements, such as drop caps and skewed headlines, have to be created in the program's PowerText applet. Also, with its master-page capability, CompuWorks Publisher is well suited for handling repetitive tasks.

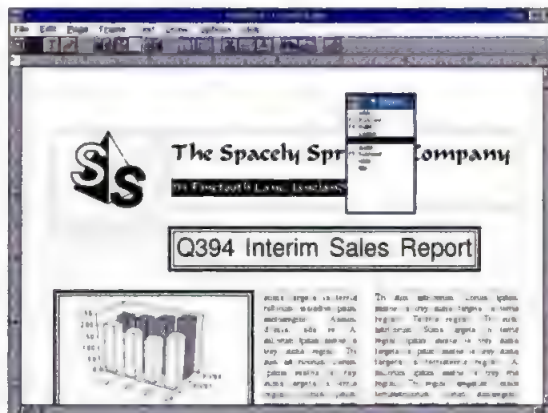
SMART PUBLISHING

One of CompuWorks Publisher's strong points is its intuitive user interface. Sixteen large icons located on a toolbar above the work area provide access to all program functions; files are mapped to a frame in CompuWorks Publisher rather than being actually imported; and if a text or graphics file is used more than once in a publication, edits to that file will appear in all copies. This approach, along with features like headers, footers, auto-numbering, named styles, and several ready-to-go templates, makes CompuWorks Publisher useful for medium-length, less design-intensive documents.

Flowing text and managing simple

structured designs are CompuWorks Publisher's strong suits. Setting up our short report was easy, and it took very little time to figure out how to use the program effectively. The lack of widow and orphan control—along with rudimentary kerning and leading control—inhibits fancy design, but spacing options are sufficient for the novice.

You should be warned, however, that there are some notable limits within CompuWorks Publisher. Pages are set only by standard paper sizes, for example.



CompuWorks Publisher for Windows offers various text styles ranging from headlines and captions to subheads and tables.

If you need a special size, such as the one for our test greeting card, you have to tweak the margins and print locations. Also, CompuWorks Publisher doesn't allow you to mix portrait and landscape layouts in the same document. Zoom views are restricted to six preset sizes, and border sizes are constrained to four widths. Furthermore, the program's

SUITABILITY TO TASK

CompuWorks Publisher

	POWER	EASE
Newsletter design	Fair	Good
Specialty	Fair	Fair
Business report generation	Fair	Fair

drawing tools are primitive at best, and bitmap editing is limited mostly to basic cropping and sizing.

On the plus side, CompuWorks Publisher, though not supporting Kodak Photo CD or TWAIN-compliant devices, offers a wide range of graphic import filters. But beware if you want to add some

**HIGH-RESOLUTION LASER QUALITY PRINTING
IS NO LONGER HIGH PRICED PRINTING.
INTRODUCING THE OKIDATA 400e-SERIES.**

If you thought that outstanding clarity and detail were only possible with a premium-priced laser printer, take a close look at the new OL410e. Now you can produce the same superb output you see here for a lot less. The OL410e is an easy-to-use 600 dpi-class output printer with 4 pages-per-minute speed, at a price well below typical 600 dpi lasers. With the OL410e, any PC user can look *Fortune* 500® on a home office budget.

Okidata also offers standout 300 dpi resolution with PC Magazine's Editors' Choice winning OL400e. The experts

Stand Out

said, "...if you want laser quality, you won't find a better bargain." Both models support Okidata's tradition of reliability with an unsurpassed 5-year LED printhead warranty.

See Okidata 400e-Series print quality for yourself. Call 1-800-OKI-TEAM ext. 374 for the dealer nearest you.

You'll find values that make your output stand out.

**YOUR BUSINESS HAS
NEVER LOOKED BETTER.™**

CIRCLE 056 ON READER SERVICE CARD

The New
OKIDATA
A Division of Oki America, Inc.

400e Series
Personal Printers.

OL400e

OL410e

FACT FILE

CompuWorks Publisher for Windows, Version 1.0

Wizardworks Inc., 5354 Parkdale Dr., #104,
Minneapolis, MN 55416; 800-759-5645,
612-544-8581; fax, 612-541-4973

List price: \$49.95

Requires: 2MB RAM, 1.5MB hard disk space,
Microsoft Windows 3.1.

In short: CompuWorks Publisher for Windows provides simple and straightforward desktop publishing capabilities with few frills. While it isn't suited for complex jobs, it does have the ability to meet basic personal and light business needs.

489 ON READER SERVICE CARD

color to your designs: Color line art images work well, but continuous tone color images are converted to gray scales.

Because CompuWorks Publisher does not support OLE or DDE operations, we were not able to design our test chart efficiently. Operation of tab controls is cumbersome, and mixing text and graphics requires a lot of experimentation. If you need to design lots of charts and tables, this may not be the program for you.

In general, CompuWorks Publisher achieves its goal of being a package that meets the needs of novice desktop publishers. If you have limited design requirements and limited time for practice, it's worth checking out.

Microsoft Corp.

Microsoft Publisher

BY GAYLE C. EHRENMAN

If you can make a few decisions, you can create an attractive publication with the \$139 Microsoft Publisher, Version 2.0. An emphasis on automation makes it suitable for even the most inexperienced of designers, yet it offers enough power and flexibility for more experienced desktop publishers. Whatever your skill level, you'll find that document creation just doesn't get any easier than this.

When you start the program, you're faced with a choice of design options, including Use a Template, Start from Scratch, and 17 PageWizard Assistants. The PageWizards really are magical: To

use one, you simply answer a few design and layout questions and then watch while the package builds a preformatted layout that meets your specifications. You can also use PageWizards for quickly adding complex elements such as coupons, calendars, ads, banners, or logos to your design.

Once you have a layout on-screen, all you need to do to customize it is add your own text and graphics. This is also a simple process, thanks to Microsoft Publisher's straightforward frame-based approach to desktop publishing. All elements of a layout, whether text or graphics, are contained in frames here. With text frames, you can adjust the margins and specify the number of columns per frame. This ability came in handy as we created our test newsletter; creating two columns in the initial text frame helped ensure that all text from the lead story flowed properly.

Don't worry if you have too much text

SUITABILITY TO TASK

Microsoft Publisher

	POWER	EASE
Newsletter design	Excellent	Excellent
Specialty	Excellent	Excellent
Business report generation	Excellent	Excellent

for the frame you've created. Microsoft Publisher provides an elegant solution to this problem by placing an icon at the end of each frame that lets you know whether the text overflows or is complete within the frame. To flow excess text, you simply click on an empty frame and the package does the rest, pouring in the text and indicating by icon that your original frame has been linked to another frame.

FORMAT STYLISHLY

Once you have your text in place, you can easily format it perfectly, thanks to Microsoft Publisher's newly added paragraph styles and kerning controls. The kerning controls, like the layout tools, are easy enough for novices to use, yet they offer precision controls for exacting designers. For inexperienced users, there is a choice of normal, tight, very tight, loose, or very loose, any one of which can be applied to an entire paragraph. The more adventurous can choose to kern

Okidata Stands Out



November 23, 1993
Okidata OL400e

If you don't believe Okidata 400e-Series printers can make you stand out, read some of the reviews we've been getting.

OL400e "...if you want laser quality, you won't find a better bargain." "During testing, it beat many of the more expensive models with 4-ppm engines."

—PC Magazine, 11/23/93

"...OL400e is breaking new ground..."

—U.S. News & World Report, 9/13/93

"...Small, Fast, and Inexpensive. Offers better performance and one of the lowest prices around. OL400e printed a sample newsletter in about a third less time (than the LaserJet® 4L)."

—PC World, 11/93

"...Laser output at unlaserlike price."

"Okidata's OL400e...may remove the last obstacle for true laser quality to permeate the budget-mindful small business."

—Byte, 9/93

OL400e "...the bargain of the year."

—PC Week, 12/20/93

OL410e "The affordable choice for users requiring 600 dpi resolution."

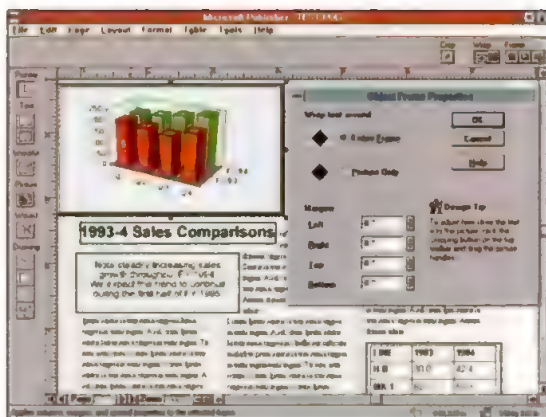
—HFD, 11/15/93

Okidata Reg. T.M., M.D. Okidata Electric Industry Co., Ltd.



GRAPHICS

Desktop Publishing Software



Microsoft Publisher gives you the choice of applying text-wrap attributes either just to the picture or to the entire frame.

specific characters by designated point values, going up to 500 points.

When you have settled on a kerning scheme, you will want to include that in a named style. Because such styles can contain everything from font style and size to spacing, alignment, and bulleted or numbered list formatting, paragraph styles proved a remarkably useful tool for formatting the text in our test newsletter and report. The only drawback to these styles is that they are saved with their publications and there is no easy way to change the defaults. Still, you can import styles from other Publisher documents or from documents created in other Windows applications.

Importing and formatting the text for our sample documents went smoothly

used for creating special text effects. While WordArt works well enough with any TrueType font, these features could preferably have been folded into the main package.

A GRAPHICS GURU

Microsoft Publisher's graphics capabilities are as strong as its text handling. The package can easily import a variety of formats or use OLE 2.0 to embed a graphic; you can also scan an image directly using a Twain-compliant device. You can crop or scale any of these graphics and attach wrap attributes (including offset amount and nonrectangular wrap shapes) to their frames, but that's all. You can't flip, mirror, or rotate imported graphics; these tricks work only on graphics created in Microsoft Publisher. Still, there are a few decent drawing tools and a shape tool that should cover most of your graphics needs.

Microsoft Publisher's consistency and strength carry through to its printing capabilities as well. What you see on-screen is pretty much what you will get in hard copy. And if for some reason the two don't match up, you can turn to the on-line Print Troubleshooter for help. In case you want to troubleshoot before you print, there is also a Layout Checker that will alert you to any potential problems, such as frames positioned outside the print area.

enough, though a couple of features emerged on our wish list for this strong type handler. The first is the ability to align lines of text automatically across columns; you can use the nudge command to move whole text frames, but sometimes you only need to reposition a single line. Our other wish is the ability to set wrap offsets for all text frames. Currently, you can wrap text blocks around one another, but if you want to create a text box with specific offsets (such as the chart caption in our report document), you must turn to WordArt, an included OLE app

In general, there is much to like in Microsoft Publisher. It goes a long way toward putting good design within anyone's grasp, and it reaches this goal in a style even experienced designers will love.

Serif Inc.

PagePlus for Windows

BY JAMES KARNEY

Serif's \$59.95 PagePlus for Windows, Version 2.0, has features found in packages retailing for ten times its price, including WYSIWYG editing, drag-and-drop layout, import filters for major word processing and graphical file formats, and color separation support. This does not mean you will be using this program to create magazines with lots of fancy graphical elements, but for less demanding desktop publishing tasks, this is a tough package to beat.

PagePlus's pasteboard metaphor allows new users to easily learn the program, while experienced desktop publishers will find how easy it is to handle most design-intensive tasks with dispatch. Objects are either placed directly on the page using the program's text and drawing tools or



PagePlus for Windows' flexible text-handling functions give you the choice of setting text defaults from objects, selected styles, or selected values.

imported from other applications.

PagePlus's user interface is well designed and features very intuitive controls: The tools and options change when you switch between text and graphics modes. We had no problem creating our test newsletter, having to refer to the manual only once or twice.

The layout tools are far better than you would expect to find in a bargain

FACT FILE

**Microsoft Publisher,
Version 2.0**

Microsoft Corp., One Microsoft Way,
Redmond, WA 98052-6399; 800-426-9400,
206-882-8200; fax, 206-883-8101

List price: \$139

Requires: 4MB RAM, 6MB hard disk space, Microsoft Windows 3.1.

In short: Desktop publishing just doesn't get any easier than this. Automation tools put attractive publications easily within reach of amateurs, while there's enough power and flexibility to satisfy the publishing-savvy user. At this price, you're not likely to find a more capable DTP tool

486 ON READER SERVICE CARD

New! Energy Star Compliant Northgate Superb-ES VESA System For Only \$1199!

Perfect Entry-Level System Or NetworkNode!

- 486SX/25 processor; upgradable to DX/33, DX2/66 and Pentium™ technology
- 4MB of 32-bit RAM
- 170MB local bus IDE hard drive
- 128K cache
- Password protected AMI BIOS with power-saving CPU, monitor and hard drive options
- MS-DOS, Windows and mouse
- 14" SVGA color monitor and 101 keyboard



Order By 5/15/94...Get A FREE 270MB Hard Drive Upgrade!

Now you don't have to have a lot of green to own an Energy Star Compliant VESA system. Just call Northgate and order our incredible new Superb-ES.

You get 486 power, VESA local bus technology, field upgradability, energy-saving design, a choice of cases, a FREE 270MB hard drive upgrade, one-year warranty, 24-hour toll-free tech support and more. All for only \$1199! Compare ... no major vendor comes close to matching this value!

Northgate Tops PC World's March 1994 Service and Support Survey!

Company	Satisfaction with service*	Problem never resolved
AST	3.4	13%
Compaq	3.5	16%
Dell	3.9	7%
Gateway	3.5	13%
IBM	3.6	14%
NEC	3.7	17%
Northgate	4.3	7%
Zeos	3.7	12%

*On a scale of 1 to 5, where 5 is best.

Your Choice of Desktop or Mini-Tower Case\$1199

Call for pricing on DX/33 and DX2/66 configurations.

**Call Northgate Today!
800-453-0133**

NORTHGATE
A Visual Cybernetics Company
141 North Jonathan Boulevard, Chaska, MN 55318

Desktop Publishing Software

FACT FILE

PagePlus for Windows, Version 2.0

Serif Inc., P.O. Box 803, Nashua, NH 03061; 603-889-8650; fax, 603-889-1127

List price: \$59.95; with ArtPack, FontPack, and TypePlus, \$99.95

Requires: 2MB RAM, 3MB hard disk space, Microsoft Windows 3.1.

In short: Despite its bargain-basement price, PagePlus is a powerful desktop publisher that offers many features found in some high-end products. But if you need to create long documents and you require better text-handling functions, your best bet is to wait for the next

version.

491 ON READER SERVICE CARD

package. Rulers move anywhere in the workspace, and both the rulers and user-defined guidelines serve as snap points. We used both of these to align text and graphics to each other, making precise placement a breeze.

Also featured is an alignment feature that lets you select and assign multiple items. PagePlus also handled our text wrap around an irregularly shaped object without difficulty.

WORDS AND IMAGES

PagePlus's text-handling capabilities are easy, allowing you to edit either in a text window or directly on the page. Text blocks can run free on the page or be set in frames, which you can use to form columns or to jump from page to page. With the Table Editor applet, which is like a specialized spreadsheet, we were able to produce our test table with color accents and with varied rows and columns and to cut and paste from an Excel worksheet without difficulty.

Of course, there is more to desktop publishing than just words. PagePlus offers basic drawing tools for circles, lines,

and boxes, and you can import common bitmap and vector formats or paste images using Windows OLE commands. The program also supports 24-bit images and Pantone colors.

One of PagePlus's more impressive features is its ability to create color separations with a PostScript-compatible device, though not with the advanced controls found in more robust applications. Another nice touch is the ability to select any part of a document as a vector or a bitmap and export it into another application.

This edition overcomes two problems found in PagePlus, Version 1.0: the lack of style sheets and the inability to place tabs and hard spaces in text blocks. You can now use templates to create a master page; we modified one to create the basic design of the test newsletter. Creating drop caps, however, was the one task we found unnecessarily difficult: We had to individually format the dropped letter and then wrap the text via a dialog box. This chore could prove tiresome if you are working on a publication with several drop caps. On the other hand, you do have complete control over the appearance by using manual adjustments.

PagePlus 2.0 is not aimed at creating long documents, and it lacks features such as headers and footers, sections, and alternate page-numbering schemes needed for such tasks. Serif is planning to release Version 3.0 later this year, which the company says will include a word processor, hyphenation, more extensive master pages, a layout proofer, and improved kerning capabilities.

Bargain-basement price or not, PagePlus is shaping up to be a product that could someday give the high-priced competition a run for its money.

SoftKey International Inc.

PFS: Publisher

BY DON LABRIOLA

SoftKey International's \$119.95 PFS: Publisher is an easy-to-use product that provides enough functionality to satisfy most nonprofessionals who want to create short black-and-white publications.

PFS: Publisher's learning curve for publishing novices is relatively easy. Its

well-written documentation includes a 70-page tutorial, an introduction to Windows, and extensive discussions of desktop-publishing concepts and techniques. The program features an on-line glossary, context-sensitive help, and a status line that describes the function of any tool button that is under the cursor.

Functionality is divided intuitively between Object-Mode page-layout functions and Text-Mode word-processing features, each with their own specialized

FACT FILE

PFS: Publisher

SoftKey International Inc., 201 Broadway, Cambridge, MA 02139; 800-826-0706, 617-494-1200

List price: \$119.95.

Requires: 2MB RAM, 4MB hard disk space, Microsoft Windows 3.1

In short: PFS: Publisher is aimed at home and small-business users who want to create newsletters, brochures, and other simple black-and-white documents quickly. While somewhat quirky, PFS: Publisher features an easy-to-use interface and fairly robust OLE implementation.

492 ON READER SERVICE CARD

toolbar and menu selections. There is also a convenient QuickButton Palette that lets users configure up to two dozen tool buttons in a personalized floating window.

DESIGNING PUBLICATIONS

Designing a publication entails choosing a template from a graphical thumbnail browser, placing empty frames on each page, and then filling each frame with text, graphics, or OLE objects. Entering text is as simple as typing it in manually or specifying the path name of a text file. The program automatically converts files created by packages such as Ami Pro, Microsoft Word, WordPerfect, and WordStar, and in many cases imports stylesheets along with the text.

PFS: Publisher's own paragraph styles can specify most of the typographic, character, and paragraph characteristics you would expect, but they omit a few important parameters like vertical alignment and character spacing. Linking a text file across frames is easy, however,

SUITABILITY TO TASK

PagePlus for Windows

	POWER	EASE
Newsletter design	Good	Excellent
Specialty	Poor	Fair
Business report generation	Good	Excellent

48-Hour Shipping On Northgate ZXPortable II™ Monochrome Notebooks!

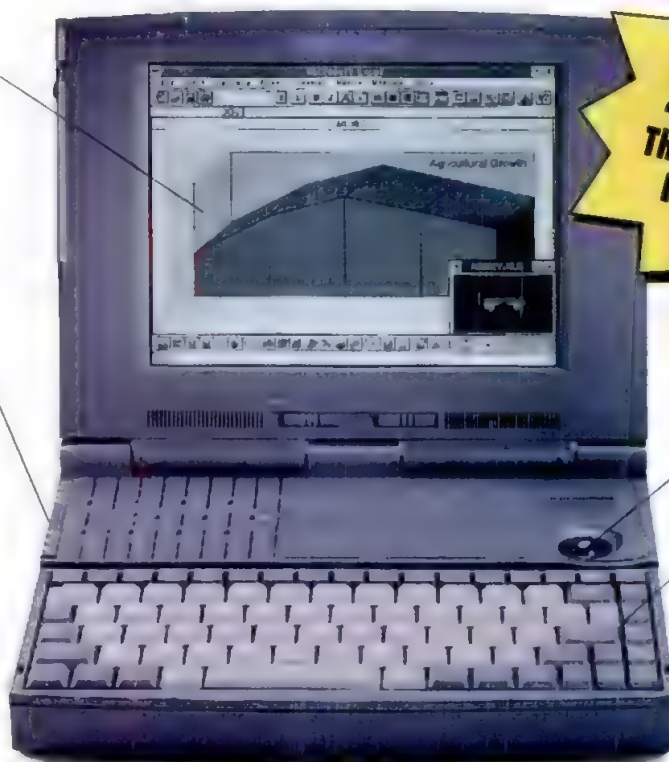
9.5" monochrome display with local bus video speed

Two Type II or one Type III PCMCIA ports

130MB hard drive

Upgradable CPU design

True 8.5" x 11" size; 6.2 lbs.



We'll Ship In 48 Hours Or The Shipping Is FREE!*

Integrated trackball

86-key keyboard with full-size keys

3.5" floppy drive



FREE 240MB Hard Drive Upgrade On Orders Placed By 5/15/94!

Now you don't have to put up with long shipping delays to get a great notebook computer at a hot, factory-direct price. Just call Northgate!

In just 48 hours, we'll ship to you the finest in notebooks – complete with swift local bus speed, long battery life, 4MB of high-speed RAM, MS-DOS, Windows and 486SX/25 speed that's upgradable to Intel's DX/33 and DX2/66 processors.

You even get a rugged, travel-ready carrying case, too.

There's more! You get a full one-year warranty, lifetime toll-free tech support 24 hours a day, seven days a week and a 30-day money-back guarantee.

Let Northgate deliver for you... call one of our knowledgeable sales reps and order now!

New Low Price...Only \$1699

ZXPortable II/Dual Scan Display\$2349
ZXPortable II/Active Matrix Color\$3299
Docking Station.....\$599

Call Northgate Today!
800-453-0131

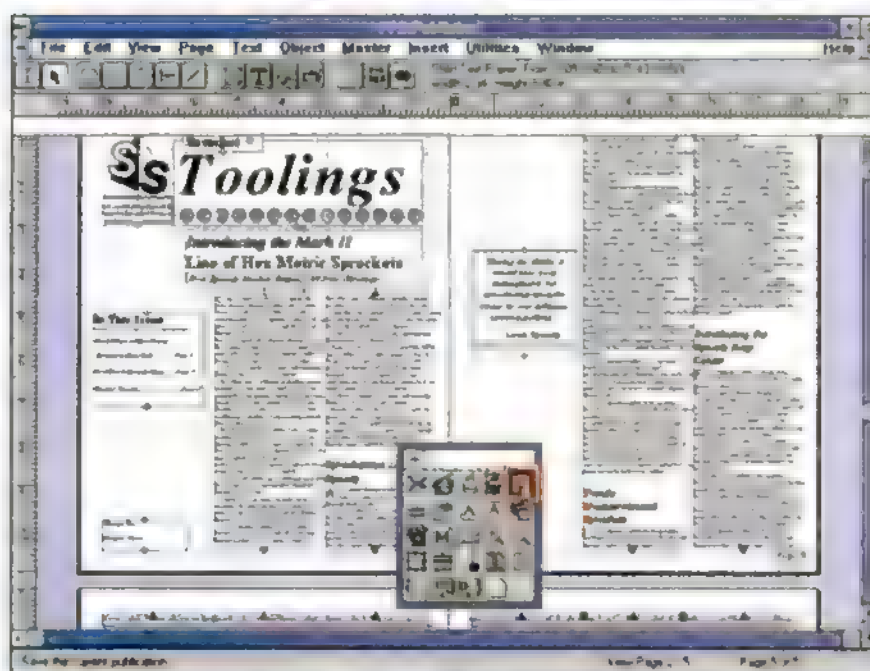
NORTHGATE
A Visual Cybernetics Company
141 North Jonathan Boulevard, Chaska, MN 55318

even when frames are on non-adjacent pages.

PFS: Publisher offers many other useful features, such as independent left and right master pages, automatic page numbering, drag-and-drop editing across pages, editable nonrectangular text wrap, link and wrap tools, and automatic table-of-contents and index generation.

In text mode, PFS: Publisher becomes a reasonably powerful WYSIWYG word processor that includes a spell-checker, thesaurus, hyphenation, reverse-text capabilities, and search-and-replace functions, as well as support for Type I and TrueType fonts. The program lacks special text effects, however, such as rotation, drop shadows, perspective, or alignment to a curve. PFS: Publisher offers only rudimentary drawing tools, and its bitmap-editing features are limited to rotation, cropping, and scaling. Furthermore, although the program can import and print color images, it has no other color capabilities.

However, PFS: Publisher boasts a powerful yet simple OLE 1.0 implementation that offsets these compromises. Rather than trying to incorporate a huge amount of native functionality, PFS: Publisher lets users embed or link to 40



PFS: Publisher's floating QuickButton palette lets users access up to twenty-four tool buttons from a convenient floating window.

such as undo, revert, object alignment, and transparent frames. On the bright side, Publisher produces nice-looking hard copy—even doing well with photographic images.

PFS: Publisher may not be the best product in its category, but it should not be overlooked. Its OLE and file-import capabilities, solid user interface, and simple but effective toolset make it an excellent value for anyone who wants to design less demanding documents and output them to an ink jet or laser printer.

Timeworks International Inc.

Publish It! for Windows

BY BRENDON M. MACARAEG

Timeworks International's Publish It! for Windows, Version 3.1, is a mixed bag: It has some nifty and powerful desktop publishing tools, yet it contains some annoying quirks and glaring feature omissions that could make creating a publication unnecessarily difficult.

Publish It! uses a frame-based approach for layout creation: You draw frames on a page, into which you import text and graphics. As you import items, you create a library (similar to QuarkXPress's library palette), a convenient file-management feature that lists the graphic and text files in three categories: stories, line art, and bitmap images.

Graphics are easily sized: Simply click a frame handle and drag to resize the image proportionately. And although Publish It! can import color graphics, it converts them to gray-scale upon import.

The package does not offer an on-line tutorial or the "wizards" found in Microsoft Publisher, but the user manual contains a tutorial that explains the package's interface. Used in conjunction with the provided templates, the tutorial can get novices up and running within an hour or so.

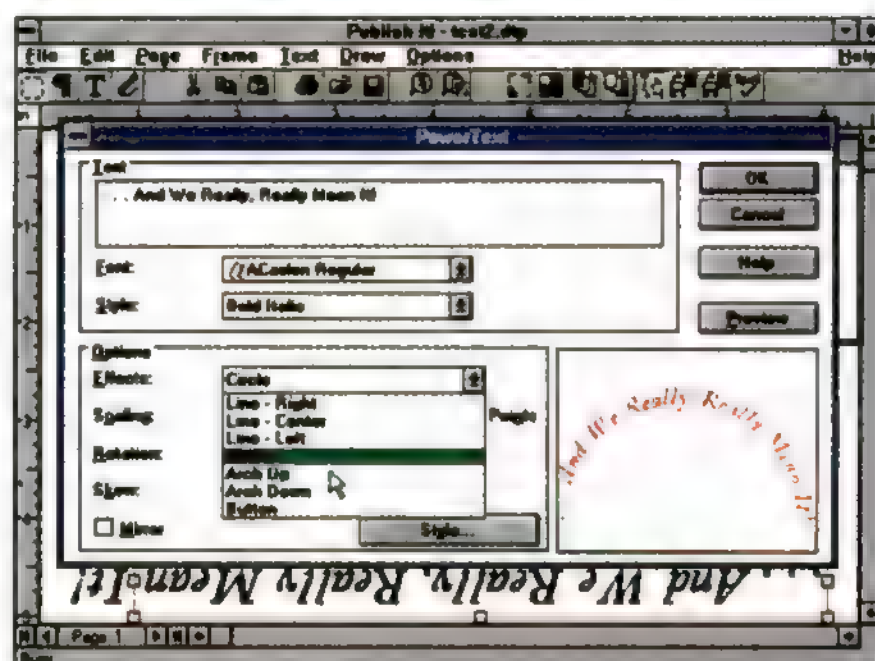
The toolbar provides one-click access to many of the most common commands, including cut, copy, paste, print, save, zoom, and import. You also select the mode you want to work in (paragraph, text, frame, or drawing).

Publish It! offers master pages that will repeat frames and their contents on all pages—a convenient feature if you plan to make long documents and a must if you wish to import text and autoflow it in a logical order on your pages.

LAND OF CONFUSION

Though you can set decimal tabs in a paragraph style to create tables, Publish It! lacks a utility for creating grid lines specifically for tables. What's worse is that the lack of OLE support means you can't embed a spreadsheet either. So if you want to create grid lines, you will just have to wing it, as we did.

To create PC Labs' test financial report, for example, we set tabs within a paragraph style to create our table, and we had to fake the grid lines around the data by drawing individual frames and



Publish It! for Windows offers a PowerText function that easily creates mirrored, skewed, rotated, colored, or curved text.

SUITABILITY TO TASK

PFS: Publisher

	POWER	EASE
Newsletter design	Good	Excellent
Specialty	Good	Excellent
Business report generation	Excellent	Excellent

types of objects with a single mouse click. We fell in love with this feature during our evaluation, using it repeatedly to add objects such as color graphics, charts, and tables.

Although PFS: Publisher usually runs well on a 386, the software slows down considerably when publications get complex. Also, a memory-management problem causes the package to consume increasing amounts of Windows resources if run for an extended period of time. Publisher also lacks features



BLACK HOLE (ARTIST'S CONCEPTION)

"THIS MEETING WAS SUPPOSED TO START A HALF HOUR AGO. WHERE IS EVERYBODY?"

It's a known fact. Busy schedules and poor communication can create black



holes that suck up co-workers just before the big meeting. Scientists can tell us a lot about black

holes, but they can't get people together on time. Only Organizer™ can do that.

Lotus® Organizer 1.1

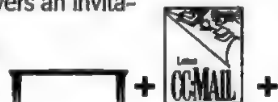
Personal Information Manager for Windows™ works across your existing ccMail® network to make pulling together that big meeting—as well as

planning your day—easier than ever before.

You simply choose attendees from

the ccMail directory. Organizer shows you a graphical view of their schedules so you can pick the best meeting time. Then Organizer delivers an invitation via ccMail.

Invitees can accept, decline, or delegate to someone else with a single click. Organizer tracks them automatically. No phone tag. Just



the easiest way ever to plan a meeting.

Organizer's group scheduler displays a user's availability only, not the entire schedule, so everyone's

privacy is protected. And invitations can be sent to anyone on the ccMail

network, even if they don't use Organizer.

Organizer does more than plan meetings. Organizer includes an on-screen calendar,

an automated to-do list, an

address book,

a note pad and

an anniversary reminder. Organizer will even sound an alarm to remind you of a commitment—like that meeting you're invited to.

There are three ways you can get Organizer: on its own; with ccMail in the 10-user Group Pack™; or for an even better deal upgrade to SmartSuite®—a suite of five top-notch, fully integrated business applications, including Organizer—for just \$299.* Call 1-800-872-3387, ext. 9516, or visit your Lotus Authorized Reseller. Because, as common as they are black

holes at work are now entirely preventable.

Lotus
Working Together



Lotus Organizer with group scheduling takes the guesswork—and the footwork—out of meeting planning.

setting borders on those frames.

Formatting text using paragraph styles can be confusing if you switch between paragraph and text modes. If you locally select a paragraph and change its font and size and then later decide to apply a paragraph style, the new font and point size of the paragraph style will not show; still, all other specifications of the paragraph style (leading, indents, justifica-

tion, and so on) are applied.

Applying a paragraph style's font and point size to locally changed text is more trouble than it's worth. You must change to Text Mode, select the locally changed text, select the default text style "normal" in the text style Library, and then change back to Paragraph Mode and apply the paragraph style. Though this process is discussed in the user's manual, most users

will find it inconvenient. Other inconveniences? Well, just don't bother looking for helpful features like Wizards, or even an "undo" command.

Version 4.0, which should be shipping by the time you read this, will have a command to override local font changes and will allow you to select multiple paragraphs for applying style attributes. It will also add more robust features, such as the ability to control paragraph breaks, a thesaurus, OLE 1.0 support,

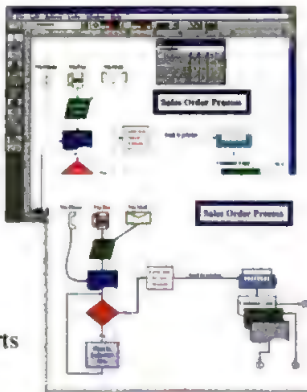


Flowcharts Any Way You Want!

Introducing Flow Charting™ 4 for Windows!

We've re-worked the basics to make flowcharting easier and more flexible than ever. We call it *sensible* technology. The end result is a flowcharting program that is incredibly powerful, yet remarkably quick to learn and use. And it's packed with everything flowcharters want. Here's a sampling:

- SensibleLines™ are totally editable. You've never experienced anything like it. Experiment with the look of your charts!
- Get your point across thanks to distortion-free shape sizing with SensibleShapes™.
- SensibleText™— Word processing masterfully designed for flowcharts — it works the way you expect!
- Job-specific shape templates let you create the perfect chart for the task at hand.
- Snapshot™ your preferences. Your charts look great every time.



And Flow Charting 4 is backed with a 90-day no-risk guarantee. Our legendary post-buy support includes free unlimited technical support, free subscription to The Flow Charter™ and access to valuable flowcharting resources.

For flowcharts *exactly* the way you want, you need Flow Charting 4 for Windows! See your local dealer today, or for a **free** interactive demo, call now:

(800) 283-4080 ext. 877
International: (408) 980-7301

PATTON & PATTON



Excellence in charting the flow of ideas™

Patton & Patton Software Corporation 485 Cochrane Circle, Morgan Hill, CA 95037

All company and product names are trademarks or registered trademarks of their respective owners.

SUITABILITY TO TASK		
Publish It! for Windows		
	POWER	EASE
Newsletter design	Good	Good
Specialty	Fair	Good
Business report generation	Fair	Fair

FACT FILE

Publish It! for Windows, Version 3.1

Timeworks International Inc., 625 Academy Dr., Northbrook, IL 60062; 708-559-1310; fax, 708-559-1360

List price: \$149.95

Requires: 2MB RAM, 3.5MB hard disk space, Microsoft Windows 3.x

In short: Publish It! excels at simplifying the page layout process and importing and placing the pieces of your DTP puzzle. But the omission of an undo command, as well as the inability to override local font changes easily with paragraph styles, makes putting your puzzle together a chore.

ON READER SERVICE CARD

and text wrap to multiple frames.

Version 3.1, however, does have some powerful text-formatting features. The PowerText command enables the program to create colored, mirrored, or curved text. Text frames created with PowerText can also be rotated at arbitrary angles.

Shortcomings aside, Publish It! is a straightforward program that delivers what it promises, though not always in the most direct way. It is best suited for inexperienced desktop-publishing users who neither need nor want to pay for the advanced functionality of a higher-end product. □



Hear the Magic of the MediaMagic™ ISP-16 Sound System.

**CD-quality sound for your PC.
It's no illusion.**

When it comes to PC multimedia, MediaMagic delivers affordability – without sacrificing technology.

**Unleash the magic of sound.
For education. For entertainment.
For business.**

With MediaMagic, the possibilities are endless – and always exciting. Expand your horizons – and awaken your child's enthusiasm for learning – with fascinating educational resources and programs. Experience the thrill of discovering the latest games and entertainment packages. Capture – and keep – your audience's attention with your next business presentation. Stereo sound adds the magic. The MediaMagic ISP-16 Sound System makes it real.

**You get components and
accessories from the most
respected names in electronics.**

Sony, Yamaha, and others. Plus features that add the real magic to mastering – and enjoying – multimedia.

- 16-bit stereo recording and playback for CD-quality sound.
- A high-performance Sony CD-ROM drive.
- A 20-voice Yamaha OPL3 FM synthesizer.
- Mixing/editing capabilities.
- Two stereo speakers. (Or add your own.)
- Incredibly easy installation.
- Support for Kodak Multisession Photo CDs.



- Exclusive de-install software.
- Compatibility with industry-standard multimedia software titles.
- FREE software from top manufacturers.

Plus friendly, experienced service and support. 6:00 a.m. to midnight CST. 7 days a week.

MediaMagic. The trick to mastering multimedia.
Call now and get a rebate for \$5 to \$20 off your next MediaMagic purchase.



1-800-624-8654

In today's world, your ultimate competitive weapon is who and what you know.

That's why over 600,000 successful people rely on ACT! to manage their relationships.

MAKE BETTER USE OF WHAT YOU KNOW.

Never again will you be at a loss for the name of your customer's spouse, the date an estimate went

formats. Customize your contact lists and your account histories to meet your individual needs, whatever they may be. You can even share ACT! files with your coworkers over your network.

NEW ACT! IT TURNS A FEW SCRAPS OF PAPER AND A HARMLESS PHONE LIST INTO A RUTHLESS COMPETITIVE WEAPON.

If you've ever lost a note, forgotten a critical meeting or found yourself searching frantically for a

out, or the location of a client's favorite restaurant.

With ACT! you can keep track of an unlimited number of contacts, phone numbers and addresses, even notes from your previous conversations. ACT! not only keeps track of your phone numbers, it keeps track of who you called,

the day and time you made the call, what was said and exactly what was

promised. There has never been a tool that so effectively lets you catalog, organize and, even more importantly, manage every single business relationship you have.

MAKE BETTER USE OF YOUR TIME.

Prioritize tasks, schedule an unlimited number of appointments, to-dos, phone calls and recurring events, carry forward incomplete tasks. View your calendar by day, week or month and print it out in over 20 calendar and address book

formats. What's more, ACT! manages all of your communications with its own built-in word processor and report generator. So you can create professional correspondence from mail-merged letters and envelopes to customized mailing labels without ever leaving ACT! It'll even send your electronic mail and faxes for you, too.

TRY THE #1 SELLING CONTACT MANAGER FREE!

PC Magazine gave ACT! their Editors' Choice Award.* Home Office Computing** gave it four stars. Now it's your turn. Try ACT! free for 30 days and receive the Taxi Online Entertainment Guide*** (a \$39.95 value) free.

So order ACT! now. Or visit your local software store.

SYMANTEC.



Mail to:

Symantec, Attn: ACT! P.O. Box 10849,
Eugene, OR 97440-9705

Or Fax To: 1-800-800-1438

Please include applicable sales tax for: AZ, CA, CO, CT, DC, FL, GA, IL, IN, IA, LA, MD, MA, ME, MI, MN, MO, NJ, NC, OH, PA, SC, TX, VA, WA & WI. And applicable local tax for: AZ, CA, FL, GA, NY, OH, TX, WA & WI.

FREE 30-DAY TRIAL WITH TAXI AS A GIFT. CALL 1-800-628-4777 EXT. 9123

Send me a free trial copy of ACT! 2.0 with Taxi as gift for just \$9.95. If I am not completely satisfied with ACT!, I may return it within 30 days free of charge. If I choose to keep ACT!, you may bill me for \$199.95. Either way, I can keep the Taxi Online Entertainment Guide as my free gift for trying this special offer.

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

☐ CHECK (Made payable to Symantec Corp.) ☐ VISA ☐ MASTERCARD ☐ AMERICAN EXPRESS

CREDIT CARD NO. _____ EXPIRATION DATE _____

Please attach this order form with payment and allow 4-6 weeks for processing your order.

*PC Magazine Editors' Choice Award Aug. 1993. **Home Office Computing, Feb. 1994. Offer valid in U.S.A. only while supplies last. Shipping and handling costs are non-refundable. SRP for ACT! for Windows is \$279.95, for DOS \$399 and for Macintosh \$249.95. This special edition of Taxi not available with any other offer. ***Guide for Chicago and New York. For more information in Canada, call 1-800-667-8661. Symantec and ACT! are registered trademarks of Symantec Corporation. All other trademarks are the property of their respective holders.

©1994 Symantec Corporation. All rights reserved.
CIRCLE 344 ON READER SERVICE CARD

PERSONAL INFORMATION MANAGERS

P is for Personal

By Hillary Rettig

It's probably the rare businessperson or executive who hasn't wished at one time or another for a 24-hour-a-day personal assistant. Personal information managers, or PIMs, can fulfill that wish to a surprising degree—and at a surprisingly low cost. PIMs can help you handle the incidental tasks of business life, including contact management, scheduling, task management, note taking, and more. A PIM can be a godsend to the busy executive or manager, and if you think you need one, you probably do.

PIMs have changed since we last reviewed them in our issue of November 27, 1990. Most packages in that roundup were character-based DOS programs, and the category is now dominated by graphical programs. In this go-round, therefore, we look only at products based on graphical environments.

Although there are capable PIMs for the DOS arena—

It's finally time
to find the PIM that
matches your style and work
habits—but doesn't further
complicate your life. Can any
one package meet this
challenge?

► IN THIS REVIEW

<i>Arcadia Workplace Companion</i>	216	<i>Instant Recall for Windows</i>	231	<i>Winfo Pro</i>	257
<i>Ascend</i>	218	<i>Lotus Organizer</i>	236	<i>Highlights</i>	210
<i>Commence</i>	222	<i>Merlin</i>	239	<i>Editors' Choice</i>	211
<i>Computer Organizer for Windows</i>	227	<i>On Schedule for Windows</i>	241	<i>Suitability to Task</i>	212
<i>DeskTop Set for Windows</i>	228	<i>PackRat</i>	242	<i>Contact Managers as PIMs</i>	220
<i>ECCO Professional</i>	230	<i>Sharkware</i>	252	<i>Summary of Features</i>	238
		<i>Time Planner Deluxe</i>	256	<i>A Parade of PIMs: New in '94</i>	251

notably Chronologic Corp.'s Instant Recall for DOS—the category now seems best suited to GUI environments. For one thing, many PIMs incorporate graphical elements, such as calendars, time lines, and Gantt charts, that are hobbled in a character-based environment. Also, because of the rich variety of information they record, PIMs benefit greatly from the flexible data-entry options one finds in GUI-based programs. Finally, PIMs benefit from Windows Clipboard, DDE, and OLE support.

The one disadvantage of GUI-based PIMs is lack of speed: Like most Windows programs, they tend to be bulkier and slower than their DOS cousins. Most of the companies in this roundup recommend 4MB of RAM to run their products; in practice, 8MB is better, particularly if you're doing real-time work such as logging telephone calls.

INFORMATION OVERLOAD

It's often tough to distinguish one PIM from another. We make it even tougher by looking at 14 PIMs that differ consid-

erably. They are: Arcadia Technologies' Arcadia Workplace Companion, Franklin Quest Co.'s Ascend, Jensen-Jones's Commence, Impulse Software's Computer Organizer for Windows, Okna Corp.'s DeskTop Set for Windows, Arabesque Software's ECCO Professional, Chronologic's Instant Recall for Windows, Lotus Development Corp.'s Lotus Organizer, Merlin Software Development Co.'s Merlin, Odyssey Computing's On Schedule for Windows, Polaris Software's PackRat, CogniTech Corp.'s Sharkware, H.M. Hinsch & Co.'s Time Planner Deluxe, and WinWare's Winfo Pro.

The prices range from \$29.95 (Computer Organizer, which is free—though there's a shipping-and-handling charge—until June 30) to \$395 (Commence, ECCO, and PackRat). The packages differ not only in price and features offered, but also in their customizability and flexibility, and in the metaphors they use to organize data.

Some, such as DeskTop Set and Lotus Organizer, offer features that resemble the address book, calendar, and other

tools you probably have on your desk. Others use spreadsheet (On Schedule) and outliner (ECCO) metaphors. And some, such as Commence and Sharkware, lack an easily defined metaphor, relying instead on an efficient dialog-box-based interface.

For any user, the ultimate challenge is in finding a PIM that fits his or her style of working. Someone whose business depends on staying in touch with people, for example, may want a PIM with strong phone book and mail-merge capabilities, such as DeskTop Set. And someone juggling several projects simultaneously may want one that emphasizes to-do lists and project management, such as Commence or Time Planner Deluxe. If you're a hacker at heart, consider Commence, ECCO, or PackRat. Commence's Agents automate tasks and task triggers; ECCO lets you build sophisticated, cross-referencing, hypertext links; and PackRat includes a macro language. If you want customizable screens, consider Commence, ECCO, Instant Recall, PackRat, or Winfo Pro. If you want sophistication with very

HIGHLIGHTS

Personal Information Managers

A NEW GENERATION of personal information managers has arrived, featuring packages that appeal to a wide variety of users. Typically, if you ask three people to describe the ideal PIM, you will get three different answers. Now, more than ever before, the PIM market offers something for everyone.

TWO GROUPS are emerging as PIMs continue to proliferate. For power users who want a lot of flexibility, PIMs such as Commence and ECCO Professional—carrying higher price tags than their simpler brethren—provide the ability to enhance and customize information management. Macros and scripting languages are a part of this development. More straightforward and lower costing products—such as DeskTop Set for Windows and Lotus Organizer—

attract buyers who aren't interested in tinkering with PIMs. You'll find basic interfaces and intuitive features in most of the products in this category.

ESTABLISHING ORDER out of chaos is now a realistic goal, once you take advantage of the capabilities that let you structure all the miscellaneous bits of information you acquire throughout your day. You should at least look for packages that include roomy notes fields. ECCO goes a step farther by letting you view all elements as outlines, adding notes at will.

CREATE A CHAIN of information with linking and integration features. Many PIMs now support integration among modules and other applications—through OLE and DDE, for example. In addition, you should be

able to drag items from your contact list into your schedule. Furthermore, you can use links with word processors—either external or internal to the PIM—to create mail-merges and whip out letters. Look also for features—like the one in DeskTop Set—that let you attach filenames to PIM items such as contacts and appointments. You can load and edit the file's application from within DeskTop Set.

PORTABILITY remains a big issue. DeskTop Set supports file formats for several palmtops. There's also Merlin, which is directly compatible with Sharp Electronics Corp.'s Wizard. You may also want to look at packages that are networkable, so that your workgroup can take advantage of a PIM's database synchronization and group scheduling features.



EDITORS' CHOICE

little fuss, consider DeskTop Set, and if you value ease of use above all, consider Organizer, Sharkware, or—for the OS/2 platform—Arcadia. Naturally, ease of use often comes at the expense of power. Your choice will depend on your work habits and the kind of information you need to manage.

THE ESSENTIAL FUNCTIONS

Anyone on the prowl for the perfect PIM must begin with the basics. Every solid PIM, particularly the ones reviewed here, focuses on four essential functions:

- **Contact management.** A good PIM records a generous amount of information about your contacts, including a minimum of two addresses (office and home), and several telephone numbers. It should have user-definable fields, and it should let you search and sort (ideally on multiple fields and using Boolean operators) on user-specified criteria. Notepads, automatic telephone dialing via a modem, history logs, and easy data-import and -export features round out the wish list.

Robust mail-merge and printing capabilities are also a must, as are preconfigured templates for popular label and address book formats. Look also for hooks to external word processors and fax programs. DeskTop Set, On Schedule, and PackRat all offer exceptional contact management. Finally, see the sidebar "Contact Managers as PIMs" for a look at ACT! for Windows and GoldMine.

- **Calendar/schedule management.** A PIM should offer rich calendar options, including views by day, week, month, and year. It should also let you schedule tasks easily using graphics tools such as clocks and time lines. Alarms—visual and aural—should be customizable, scheduling conflicts should be brought to your attention and automatically resolved, and recurring tasks (weekly staff meetings, for example) should be easy to set up and alter, if necessary. In addition, there should be a flexible array of calendar-printing options, including templates for popular scheduler formats such as Day-Timer and Franklin Day Planner. The package should also provide filtering of events by date, status, and other criteria prior to printing.

- **DeskTop Set for Windows**
- **ECCO Professional**

Anyone who has searched endlessly for the perfect PIM knows that what makes a PIM work for one person can be the very thing that makes it unsuitable for someone else. Matching style and work habits to an interface and a card file is not easy.

Because it's unlikely that any one PIM can ever be all things to all people, we've selected two Editors' Choices: Arabesque Software's ECCO Professional, Version 1.1—a feature-packed program that can handle almost any information management task that comes its way—and Okna Corp.'s DeskTop Set for Windows, Version 4.0c—an easy-to-use organizer that builds on the paper-based tools most people can't do without.

ECCO's flexibility, feature set, and overall power make it a winner. Admittedly, its learning curve may prove too steep for some, but those who tough it out will find their efforts rewarded.

Especially impressive is ECCO's use of an outline metaphor, which lets you cross-reference, link, and view information in a wide variety of ways. Essentially, you can link all elements in ECCO. For example, you can take meeting notes in outline form and drag a contact into your notes, creating a hypertext link that lets you jump over to other elements that mention the same contact. The package comes with several templates that can be used as guides in creating outlines. It also has an excellent filtering system, which lets you change the way information is displayed.

ECCO's folders provide a way to enhance the already sophisticated outline feature. You can organize your folders into projects or meeting notes, for example, and drag contacts or appointments—as dynamic links—to those folders. ECCO's Shooter feature is a cut-and-paste variant that lets you swap information between ECCO and your other applications.

By contrast, DeskTop Set is a study in simplicity. Fully usable right out of the box, DeskTop Set features an intuitive and elegant interface, is highly graphical, and makes good use of drag-and-drop. Sophisticated linking lets you link appointments to contacts and calendar items to a to-do list. Furthermore, the search feature is quite comprehensive.

DeskTop Set's phone book offers fields for office, home, and miscellaneous information. There are also 32 user-definable fields. Its dialer offers more setup options—including Caller ID—than just about any other program. Printing DeskTop Set's address book and calendar ranges from easy (if you stick with the program's default templates) to sophisticated (if you choose from a slew of printing options).

Honorable mention goes to Lotus Development Corp.'s Lotus Organizer, Release 1.1, whose ease of use has won it mass appeal. Organizer doesn't track and store complex information, but it does have some cross-referencing and linking capabilities. Also, it is a slick scheduler. In fact, when paired with cc:Mail, Organizer can be used as a group scheduler—another reason why its simplicity is invaluable.

A final word goes to Polaris Software's PackRat. We would like to have more kind things to say about this powerful program, which has long been able to handle complex information management tasks. Once Polaris solves the problems that kept the program out of contention for an Editors' Choice this time around, PackRat will most likely be worth your consideration.

Suitability to Task:**Personal Information Managers**

The PIMs in this roundup span a large price spectrum and display various capabilities, even in the four main areas of personal information management: contact management, calendaring and scheduling, task management, and information management. Different products emphasize different areas; if a product scores poorly in one category, it could still suit a user who doesn't need features in that area.

A package's usefulness for **contact management** depends greatly on the structure of the database used, as all contact data is stored in a database format. We evaluate the processes of adding and deleting records, making phone calls, searching the database, and creating mailing labels and contact reports. We look at the range of fields provided in the default contact screen, and whether the user can create more fields and customize the screen. We rate the ability to import data from a variety of

SUITABILITY TO TASK		
Product Name		
	POWER	EASE
Contact management	Poor	Excellent
Calendar and scheduling	Fair	Good
Task management	Good	Fair
Information management	Excellent	Poor

sources, and we determine whether the user can create new entries using existing record data. We also look at how well the package lets the user access contact data from other modules in the package.

Our **calendaring and scheduling** category involves the process of scheduling meetings, tasks, and phone calls. We also rate calendar features, focusing on ease of data entry, clarity of appointment displays, and the ability to resolve conflicts. Furthermore, we look at group scheduling abilities. High scores go to packages that ease scheduling, resolve appointment schedules, and provide easy viewing and printing of calendars and schedules.

- **Task/project management.** A PIM should let you set up multiple to-do lists and sort the items in each either alphabetically or according to due date or priority. You should also be able to "float" or reschedule overdue tasks automatically. A PIM's project management capabilities—though nowhere close to those of a dedicated project manager—should include the ability to define projects for single persons and workgroups, monitor tasks within those projects, and display progress on a Gantt chart. Ascend offers superb to-do list capabilities, and Organizer and Time Planner Deluxe support project management admirably.

- **Miscellaneous-information management.** A PIM should give you a choice of places to store miscellaneous information (including text and graphics), which can be freestanding or associated with contacts and events. The best programs offer unlimited note sizes and OLE client functions. Look for these features in ECCO and PackRat, for example.

THE ENHANCEMENTS

Besides the elements described above, there are four equally important criteria to help you choose a PIM:

- **Flexibility.** As much as possible, a PIM should mold itself to the way you work, not vice versa. Commence, ECCO, Instant Recall, On Schedule, and PackRat all let you customize the screen views of your information. Other programs, such as DeskTop Set, let you enter information at more than one point in the program—enabling you to, say, enter appointments via the phone book and new contacts via the calendar. Programs such as Commence, ECCO, and Instant Recall provide different views of your information. For example, ECCO lets you view your day's appointments in a graphical calendar and in outline form.

- **Internal integration.** Information in your PIM should be visible from many places, but it should need to be entered only once. Thus, for example, your appointment scheduler should automatically display

In rating **task management**, we look at how well a package lets the user create projects and tasks and assign resources—including groups and individuals—to each one. We evaluate the ease of creating to-do items and maintaining history logs. We also look at the package's ability to let the user associate tasks with specific resources. High scores go to products that offer priority levels, status tracking, and well-defined task and to-do categories.

To evaluate **information management**, we place less emphasis on task-specific information and more on flexibility. We rate a package's ability to bring together—in a coherent structure—information that the user inputs either as part of a project, contact, or schedule or as a random idea. High scores go to packages that let the user easily enter random, free-form notes and link these notes to different sections in the package.

We evaluate the creation of links among sections, as well as integration with other products, particularly word processors. We rate reporting, macro, and networking features, as well as product portability, fax and e-mail support, security, and database backups.

information about your contacts from your phone book, and items from your to-do list or project scheduler should automatically show up on your daily schedule. Commence and DeskTop Set are especially well-integrated programs.

- **Global access to information.** Someone recently offered you a great deal on a truckload of bananas—but who was it? And where did you type in that person's name and number? A good PIM will provide a flexible global-search feature that searches your entire database for keywords, preferably using Boolean operators.

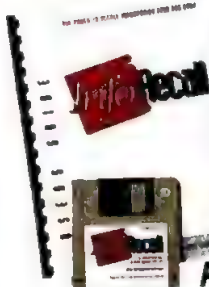
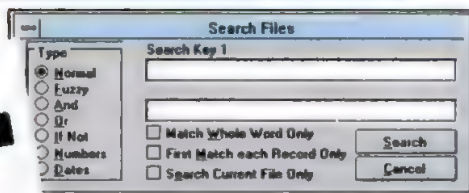
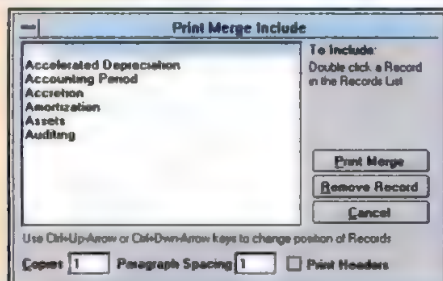
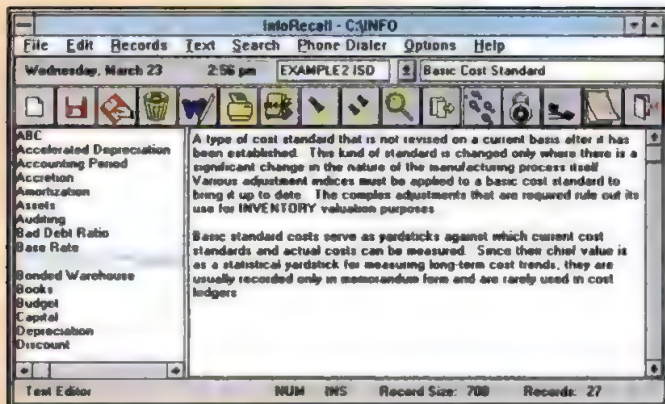
- **Extensibility and portability.** The information stored in your PIM is your professional lifeblood. The best PIMs recognize this and provide features to help you leverage that information even outside of the program. These include robust DDE

Our Contributors: DON WILLMOTT is a senior editor of *PC Magazine*. STEVE GILLILAND and KATHY YAKAL are journalists who have covered the PC industry since 1983. GREGG KEIZER is a free-lance writer for a variety of computer, technology, science, and entertainment publications. HILLARY RETTIG is a computer consultant and contributes regularly to many computer and business magazines. TED STEVENSON was the associate editor in charge of this story, and KATHLEEN CASTER was the associate editor pro tempore during his numerous jury-duty-related absences. AMARENDRA SINGH was the project leader.

INFORMATION OVERLOAD?

CREATE ORDER OUT OF CHAOS!

WITH INFORECALL, INFORMATION MANAGEMENT HAS NEVER BEEN EASIER!



Feature Packed!

Powerful Search Features, Search and Replace, Hypertext, Import ASCII or Word Processing documents, Export, Back-Up, Restore, Print, Print Merge, DDE to Word for Windows/ WordPerfect/AmiPro, Print Preview, Print Page Set-Up, Toolbar, Password, Date/Time Insert, Autosave, Quick Jump to Last Closed Record, Phone Dialer, Move, Copy, Print, Delete Single or Multiple Records, Boilerplate Text, Calculate, Split Window Vertically or Horizontally, Expand/Contract Text Editor, Change Color& Fonts and more!

InfoRecall is a new type of software, especially made to store and find information **FAST** and **EASY!** **InfoRecall** ties all your information together with its powerful hypertext and search features. Never again will you be looking all over for that important piece of information.

Information Overload.

You deal with a tremendous amount of information on a daily basis but too often the information you need is not quickly accessible. **InfoRecall** remembers everything for you. Imagine having your variety of information in an electronic filing cabinet where you can find everything in a flash, then manipulate it, massage it, import text to it, export it, print it, fax it, DDE it to your favorite word processor and much more!

Work Your Way.

InfoRecall uses a very friendly **FREE-FORM**, unstructured, variable-size data base so you can enter data any way you

want to. No need to worry about fields and structures that limit you. Just put in your information from a few words to 32,000 characters per record. With as many files or records as your hard disk can hold, **InfoRecall** will never tie you down!

Easy To Use.

It's really easy to use. We guarantee it! You'll be up and running in just a few minutes. If you don't have the time to learn a complicated package, **InfoRecall** is for you! Just turn it on, type a record name and type in some text or import text and you're on your way. And help is just a keystroke away. **InfoRecall** uses context-sensitive help throughout. Press a key and you get help directly related to what you're doing.

Hypertext Links.

Every piece of text, every word, can be a linkable element of your information system. Large amounts of data can be accessed with a few key words. **InfoRecall** supports not only links between text, but also between files in its hypertext-like environment to provide a robust multi-file access medium.

Powerful Search Engine.

Having information is of little use if you can't find what you need in hurry. **InfoRecall** ties all your information together with its powerful search facility. And **InfoRecall** searches through your files with blazing speed. Search a single file or search all your files and find a word or phrase or a block of text in seconds. **InfoRecall** lists your finds and allows you to access records and files directly and quickly and highlights the find for you. Re-access the find list as many times as you want, print a list of finds or the entire text. **InfoRecall** supports Normal, Exact, Fuzzy, And, Or, If Not, Dates and Numbers searches.

Unlimited Uses.

InfoRecall does much more than manage your bits and pieces of random information. Use it to maintain Client lists and notes, Business contracts, Legal contracts, Product lists, Customer records, Ideas, Names and addresses, Magazine articles, Corporate training, Concepts, Practices, Policies, Patient records. Regardless of who you are or what you do, you'll find endless uses for **InfoRecall**.

Risk-Free Offer:

InfoRecall is such a great productivity tool, you'll be amazed. Try it for 30 days, if you don't think so, return it and we'll refund your money.

Now Only \$99.95

Retail Price \$138.95

Sample files and User Guide Included

Call Toll-Free:

800-208-1311

Fax: 416-502-1345

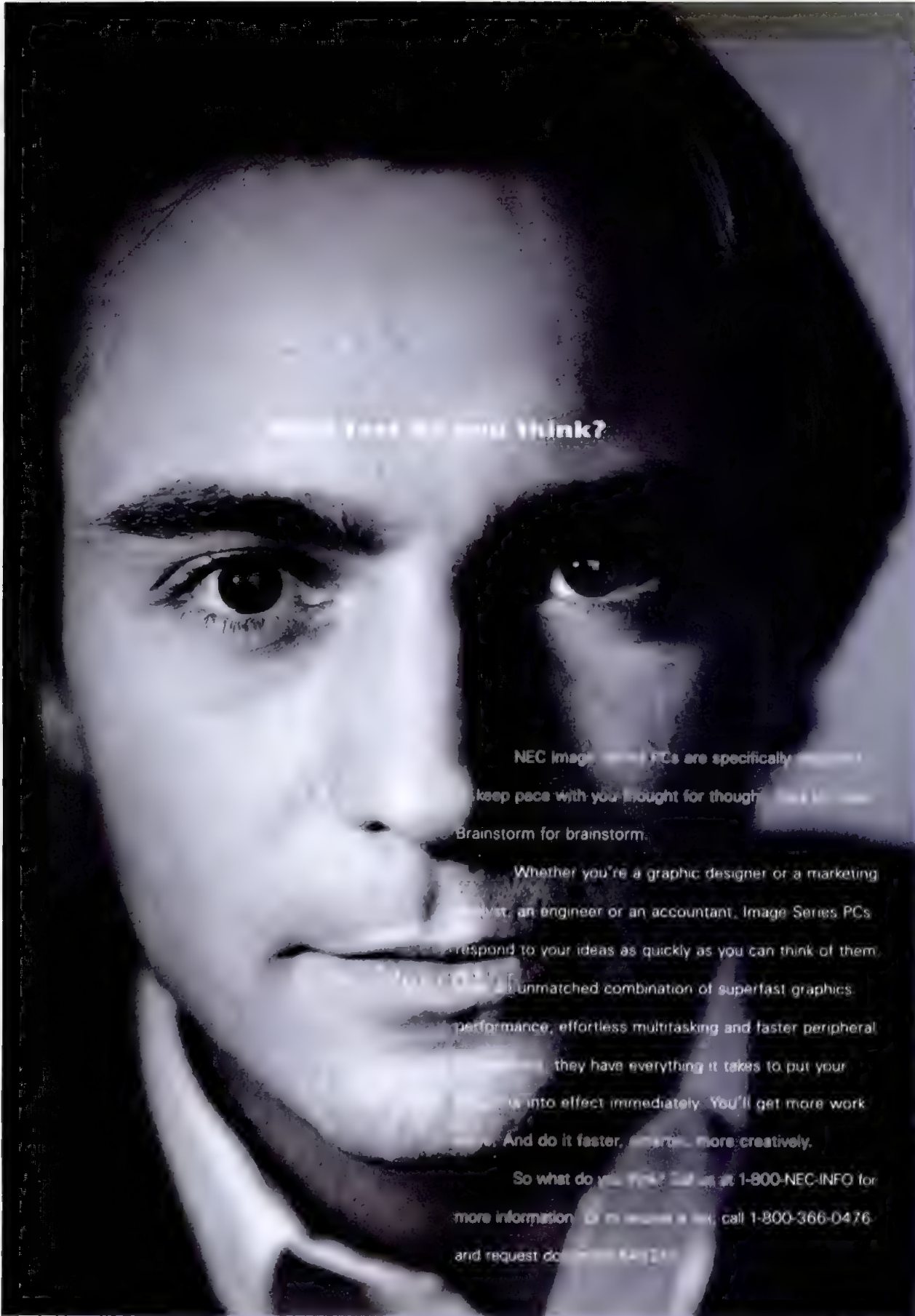
Call for Network and Site License pricing.
InfoRecall™4.0 for Windows®
By Phantech Software Inc.

InfoRecall
The power to recall
information fast and easy.

How fast is an Image™ Series PC?



Image 486es is a registered trademark of NEC Corporation. Intel Inside is a registered trademark of Intel Corporation. Energy Star is a registered trademark of the U.S. Environmental Protection Agency. © 1994 NEC Corporation. All rights reserved.



What else will you think?

NEC Image Series PCs are specifically designed to keep pace with your thought for thought. They're like your Brainstorm for brainstorm.

Whether you're a graphic designer or a marketing analyst, an engineer or an accountant, Image Series PCs respond to your ideas as quickly as you can think of them. They offer an unmatched combination of superfast graphics performance, effortless multitasking and faster peripheral response. They have everything it takes to put your ideas into effect immediately. You'll get more work done. And do it faster, smarter, more creatively.

So what do you think? Call us at 1-800-NEC-INFO for more information. Or in voice mail, call 1-800-366-0476 and request document 849241.

Personal Information Managers

and OLE support, along with macro and scripting languages. Look also for macros that interoperate with other programs, including word processors and e-mail and fax packages.

To networked users, a PIM's networking and workgroup scheduling features are essential. A PIM should have the ability to share contact databases, serve as an e-mail front end, and automatically schedule meetings among workgroups (Ascend, Instant Recall, and Organizer are strong here).

Portability entails the ability to work with laptop computers and hand-held devices. Users of hand-held devices such as Sharp Electronics Corp.'s Wizard and the Casio B.O.S.S. should make sure their PIMs import and export to the appropriate formats (DeskTop Set and PackRat, for example, handle these devices). In addition, Merlin works not only on PCs but also on Sharp's Wizard. Programs like Commence provide a synchronization feature that merges two databases.

Some PIMs round out their offerings by including financial tracking and time-and-billing capabilities (Commence and PackRat) and direct interfaces for telephone Caller-ID services (DeskTop Set).

1993: A VOLATILE YEAR

1993 was an important year for the PIM category, and one marked by volatility. The first major event of the year was the July release of Polaris's PackRat, Version 5.0. PackRat, of course, was a perennial market leader, and had garnered numerous industry awards (including an Editors' Choice in our 1990 roundup). The reworked program was based on an object-oriented methodology that let users grow their own PIMs from preprogrammed elements. Polaris's innovation was a welcome addition to the marketplace, but PackRat 5.0 proved buggy and unstable, and many users were inconvenienced by disk crashes and other frustrations. As of this writing, PackRat has seen several maintenance releases and upgrades, but we do not yet consider it a fully working product.

In the meantime, and perhaps not entirely coincidentally, several other PIMs rose to the fore—most notably ECCO, which was introduced in 1993. Though not without its quirks, ECCO immediately

attracted attention because of its flexibility and powerful outliner-type interface. 1993 and, so far, 1994 have also seen the birth of a few other promising PIMs: On Schedule, Sharkware, and Time Planner Deluxe.

ON THE HORIZON

In the future, look for enhanced networking and workgroup capabilities, as well as for enhanced implementation of DDE and OLE (OLE 2.0 and server capabilities, in particular). Look also for functional overlap with Windows shell programs (many PIMs already launch other applications) and greater interoperability with word processors and other programs. PIMs will also become more sophisticated as users become less shy about scripting languages and other advanced features.

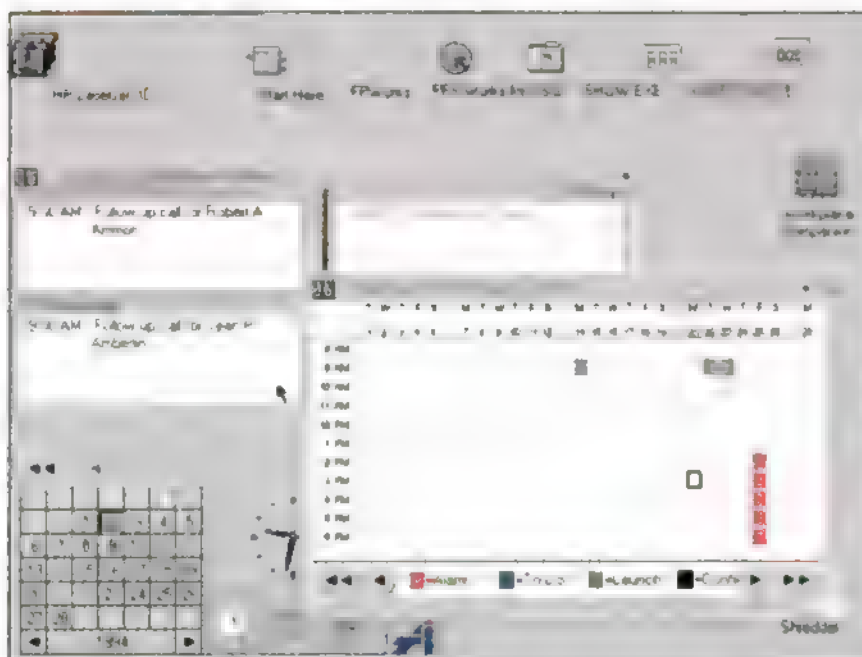
PIMs have progressed considerably over the years—especially over the past couple of years—and PIM vendors seem forever undaunted in their efforts to build the perfect PIM. Many programs in the new crop are impressive in their power and fascinating in the elegance of their design. No matter what your information management needs and budget, you're bound to find a PIM that's right for you.

Arcadia Technologies Inc.

Arcadia Workplace Companion

BY STEVE GILLILAND

With Arcadia Workplace Companion (\$179.95), Arcadia Technologies brings a welcome PIM to the OS/2 environment. The package doesn't set the data management world on fire, but it does offer some unique twists, such as a phone/address



You can pop up Arcadia's appointment book and time planner at any time for easy appointment scheduling.

SUITABILITY TO TASK

Arcadia Workplace Companion, Version 1.54

	POWER	EASE
Contact management	Good	Good
Calendar and scheduling	Fair	Fair
Task management	Fair	Good
Information management	Fair	Fair

book to which you can assign identifying icons and a free-form notepad feature that manages both text and graphics.

Arcadia and OS/2 are combined in a pleasingly neat opening screen that presents a large clock, a monthly calendar, and launching-pad icons for the Arcadia modules. These modules include the phone/address book, an appointment book, and a launcher for a user-definable alternative application. All of Arcadia's many tools are close at hand.

The phone/address book is the repository for contact data, and the module into which data from other applications is imported. But although data is supposedly importable into the phone/address book from any .CSV file, you must separate data fields by quotation marks as well as commas. It took us several attempts to add the quote marks to our .CSV file and import the data successfully. But we were able to import appointment book data from a second copy of Arcadia without any trouble.

Each contact record provides 37 data fields for phone/address book information, including 11 user-definable fields. There is also a 512-character note page for each contact. Each record's fields are divided into tabbed "pages" for quick location of primary and secondary address data, phone numbers, notes, and user-defined fields. In a novel twist, you can associate an icon (a dozen or so are furnished) with a contact name and open a contact record by clicking on the icon.

When you're adding new entries, the Create Another option duplicates data in the selected record. You can use the Find filter to search any field—including any user-defined field—for text strings. The package keeps a time- and dura-

Workstation Sensation!

Faster Processor. Lower Profile. Bigger Value.

While this modest beauty will nestle in your most cluttered corner, its performance demands center stage. Because its 75MHz IntelDX4 processes data 50% faster than DX2-based systems. And its 32-bit local bus delivers IDE and video performance that's 4x faster than a 16-bit bus.

So if you use advanced peripherals like full-motion

video, or graphics-orientated operating systems like Windows or OS/2, this workstation will significantly improve your productivity. And expansion slots, serial ports, and add-on options give you upgrade choices usually associated with much larger systems — at much higher prices! Which makes this low profile a true workstation sensation.

C475D Low Profile

- ☐ 75MHz IntelDX4 Processor
- ☐ ZIP Socket, Upgrade to Pentium™ Technology
- ☐ VESA Local Bus
- ☐ 4MB RAM, Expandable to 64MB
- ☐ 212MB Hard Drive, Local Bus IDE Controller
- ☐ 128K Cache, Expandable to 256K
- ☐ 14" N-I 72Hz HVGA Monitor



- ☐ 3.5" 1.44MB Floppy
- ☐ Two 5.25" and One 3.5" Accessible Drive Bays, One 3.5" Internal Bay
- ☐ Five 16-Bit ISA I/O Slots
- ☐ Two Buffered Serial Ports, One Bi-Directional Parallel
- ☐ Chassis: 4.4" H x 17.2" W x 16.6" D
- ☐ 101-Key Keyboard, 2-Button Serial Mouse
- ☐ MS-DOS 6.21, Window For Workgroups 3.11, CompuServe Starter Kit, Close-Up 4.0, AmiDiag Lite

- ☐ 30-Day Money-Back Guarantee
- ☐ 30-Day Price Protection
- ☐ 30-Day Free Insurance
- ☐ One Year Onsite Service
- ☐ One-Year Limited Warranty
- ☐ Out-Of-Warranty Repairs

- ☐ Lifetime 800 Support
- ☐ Lifetime Technical Support
- ☐ Remote Rescue Online Support
- ☐ Onsite Installation Option
- ☐ Environmentally Sensitive Packaging

\$1,999

(Or Lease For Only \$73/Month)

To Order, Call (7am - 7pm CST)

1-800-456-3660

Fax 512-331-2862

CIRCLE 128 ON READER SERVICE CARD



CompuAdd

CUSTOMER DRIVEN, BY DESIGN.

12303 Technology Boulevard
Austin, Texas 78727

© 1994 CompuAdd. All rights reserved. CompuAdd is not liable for damage due to accidents or typographical errors. The Intel Inside logo is a registered trademark of Intel Corporation. Microsoft, Windows, Close-Up, CompuServe, and all other brand and product names are trademarks or registered trademarks of their respective companies.

Personal Information Managers

tion-stamped log of your calls. You can take notes on a call and add a prioritized follow-up item to the to-do list.

You can schedule appointments from the phone/address book—helpful when you complete a call with a contact—and make an appointment to start an application at a specific time. You can also enter appointments by bringing up a weekly or daily schedule from the calendar icon on the main screen, or by choosing a time from the graphical time planner, a monthly schedule of your appointments and free time. Clicking on a date on the opening screen's calendar brings up not the appointment book but the to-do list, and items there are easily converted into appointments. All information from all lists and the notepad can be freely exchanged by dragging and dropping from one open screen to another. The package supports an unlimited number of screens.

You can store random information in the notepad, a tool of unlimited size that you can organize into chapters and pages. You can use straight text or bitmapped or metafile graphics, but there is no support for enhancing fonts. The lack of dynamic file-linking and System Object Model (SOM) support are drawbacks. Arcadia would also benefit from a mail-merge facility and stronger links with external word processors.

Arcadia is quick and easy to learn, and it

manages contacts and phone calls well and appointments adequately. It constitutes a viable option for OS/2 users.

Franklin Quest Co.

Ascend

BY HILLARY RETTIG

Version 4.0 of Franklin Quest Co.'s Ascend (\$199.95) is a somewhat exasperating blend of excellence and insufficiencies. Based on the popular Franklin Day Planner organization system, Ascend offers respectable and sometimes superb PIM functionality, but it lacks key features that sophisticated users may expect.

The good news first: Ascend boasts one of the best user interfaces in the business. The program, which lets you use multiple modules simultaneously, makes good use of color to organize complex information and intelligently resizes windows to keep key screen elements visible. Occasionally, the interface falters; the Appointments Scheduler, for example, is clunky. But the interface is generally attractive and efficient.

Ascend's hierarchic to-do lists are perhaps the best to be found in any PIM. A sophisticated Prioritization feature automates task forwarding and rescheduling, and there are many to-do-list extras—including timers, user-definable categories, and a graphical feature that displays actual versus estimated time spent on tasks.

Finally, Ascend offers more ways to store miscellaneous information than any other PIM, and includes a daily journal, a quotations database, a user-configurable flat-file database ("Turbo File"), and numerous notepads. Most users will appreciate having many information-storage options, and a fast global-search feature further facilitates easy access to information. Ascend's network version offers good workgroup scheduling, including a feature that automatically searches users' calendars to determine the earliest free time for a meeting.

In contrast with the above, Ascend's core features—its phone book and appointment scheduler—are solid but unexceptional. The phone book's

FACT FILE

Ascend, Version 4.0

Franklin Quest Co., 2550 S. Decker Lake Blvd., Salt Lake City, UT 84119; 800-877-1814, 801-975-9992; fax, 801-975-9995

List price: \$199.95.

Requires: 2MB RAM, 2MB hard disk space, Microsoft Windows 3.0 or later.

In short: Ascend is an unusual PIM based on the Franklin Day Planner system. It boasts a

superb to-do list module and strong information management features, but its phone book and scheduler—though serviceable—lack integration, customizability, Boolean searches, flexible print options, and other advanced features. Ascend's user interface, however, is excellent, and its hierarchic to-do lists are perhaps the best to be found in any PIM.



ON READER SERVICE CARD

data entry screen is nicely designed: You can record two addresses and five telephone numbers for each contact, and you can also maintain call-logging and contact histories. Ascend's phone book, however, isn't well integrated with either its to-do list or its scheduling modules; links must often be created manually, and contact information cannot be automatically imported into event titles.

Although Ascend supports Franklin Day Planners for output, its print options are limited compared with those of other PIMs. For example, there are only three label formats. Furthermore, the program lacks amenities such as user-definable fields (except for telephone numbers),

FACT FILE

Arcadia Workplace Companion, Version 1.54

Arcadia Technologies Inc., 735 W. Duarte Rd., #207, Arcadia, CA 91007; 818-446-6945; fax, 818-447-4212

List price: \$179.95.

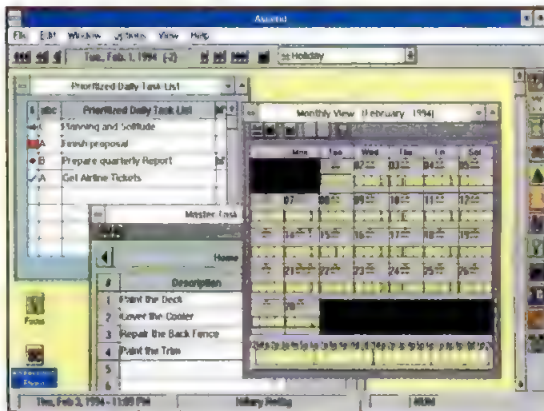
Requires: 2MB hard disk space, 8MB RAM, OS/2 2.1 or later

In short: Arcadia Workplace Companion provides reasonably balanced scheduling and contact management with a few unique

features OS/2 users will welcome. One such feature, the user's ability to assign icons to individual contacts, allows for easy access to frequently used records. One shortcoming is that while Arcadia is able to handle free-form notes, it does not associate them with contacts.



ON READER SERVICE CARD



Ascend offers superior scheduling and to-do lists. Its clear user interface helps the user manage complex information.

Mini Masterpiece.

Faster Processor. Bigger Bus. Better Value.

Although its footprint is small, this Pentium™ mini-tower can really run! In fact it's 4-ways faster than any 66MHz 486DX2 system. It has more transistors, runs at faster clock speed, executes more instructions per cycle and provides greater bandwidth. The result is a system that processes and transports data at twice the speed! (For math-intensive applications you'll experience speeds up to 5X faster.)

A standard 256KB of write-back cache, 425MB hard drive and Windows For Workgroups 3.11 software will boost productivity immediately. Eight expansions slots, two buffered serial

ports, and a PCI SCSI-2 option let you expand subsequently. And our low price and high service standards make the system an asset, ultimately. Which is why this mini masterpiece is a timeless masterpiece, as well!

Pentium Mini-Tower

- ❑ Intel 60MHz Pentium Processor
- ❑ 8MB RAM Expandable to 128MB
- ❑ 256KB Write-Back Cache on Motherboard; 16KB Write-Back Cache on Chip
- ❑ ZIP Socket Accepts OverDrive for Pentium Processor
- ❑ 425MB IDE Hard Drive with New Type 3 HD Controller
- ❑ 3.5" 1.44MB Floppy
- ❑ 14" N-1 72Hz 1280x1024 HRCVA Monitor
- ❑ PCI W32p Video With 2MB RAM
- ❑ PCI SCSI-2 Optional
- ❑ Dual Speed CD Rom Drive, MPC2-Compliant
- ❑ 8 Expansion Slots: 3 PCI, Five 16-Bit ISA
- ❑ 2 Buffered Serial Ports;
- ❑ 1 Bi-Directional Parallel Port

- ❑ Drive Bays: Three 5.25", One 3.5" Accessible; Three 3.5" Internal
- ❑ Dimensions: 16.4" H, 7.3" W, 16.5" D
- ❑ 101-Key Enhanced Keyboard and 2-Button Serial Mouse
- ❑ MS-DOS 6.21, Windows For Workgroups 3.11, CompuServe Starter Kit, Close-Up 4.0, AmiDiag Lite



- ❑ 30-Day Money-Back Guarantee
- ❑ 30-Day Price Protection
- ❑ 30-Day Free Insurance
- ❑ One-Year Onsite Service
- ❑ One-Year Limited Warranty
- ❑ Out-Of-Warranty Repairs
- ❑ Lifetime BBS Support
- ❑ Lifetime Technical Support
- ❑ Remote Rescue Online Support
- ❑ Onsite Installation Option
- ❑ Environmentally Sensitive Packaging

\$2,999

(Or Lease For Only \$89/Month)

To Order, Call (7am - 7pm CST)

1-800-456-3660

Fax 512-331-2862



12303 Technology Boulevard
Austin, Texas 78727

▪ Contact Managers as PIMs

By Kathy Yakal

The line between PIMs and contact managers is often indistinct. While PIMs tend to focus on elements such as personal scheduling and random-information management, and contact managers tightly link tasks and appointments to individual contacts, there's still some crossover.

In our August 1993 roundup of contact managers, *PC Magazine* awarded an Editors' Choice to both Elan Software Corp.'s GoldMine (now \$295) and Symantec Corp.'s ACT! for Windows (now \$395). To see how these two stacked up as PIMs, we ran them through the same evaluation process we used to determine our Suitability to Task ratings for the PIMs in this roundup.

In order to fare well on our tasks, a product must offer solid links between contacts and other elements, letting a user easily attach data to a record and scan contact history. But a product should also let a user manage data that isn't connected to any contact, and not all contact managers can do this. Also, a product must let a user enter, organize, and search miscellaneous data—another feature often beyond the capacity of contact managers.

On our **contact management** task, ACT! scored an *excellent* in both power and ease, while GoldMine scored an *excellent* in power and a *good* in ease. On our **calendar and scheduling** task, ACT! earned a *good* in power and an *excellent* in ease, while GoldMine posted an *excellent* in power and a *good* in ease. On our **task management** task, ACT! scored a *good* in power and an *excellent* in ease, while GoldMine earned an *excellent* in power and a *good* in ease. Finally, on our **information management** task, each package scored a *good* in both power and ease.

Both packages let you build detailed databases, log your interaction with contacts, attach notes and reminders,

and maintain thorough contact histories. Yet ACT! doesn't let you schedule a meeting or to-do item without linking it to a contact, which hampers its usefulness as a PIM. GoldMine is better in this regard; while appointments need to be linked to a contact, to-do items do not.

Neither ACT! nor GoldMine is

particularly strong at managing random information. You can attach notes to contact records in both, and GoldMine goes a step farther by letting you attach notes to meetings, to-do items, next-scheduled actions, and so on. GoldMine

also contains a Scratch Pad feature for random notes, but you can't search this. To store and search unstructured text in both, you must set up a record and use the standard notes features. While both programs offer plenty of user-definable fields, these fields are limited in space.

GoldMine's Profile feature gives the program some unusual flexibility. Profiles are optional lists of fields unique to each contact record; pop one up and define the fields you'd like for that contact ("Birthday," for example) and you've got an even more detailed record.



GoldMine's Profiles help you keep track of more detailed contact information than the main screen allows.

You can have an unlimited number of Profiles, and you can search them.

In comparing ACT! with GoldMine, we found Act! fell short because of its inability to work on a LAN; GoldMine suffered because it's DOS-based and is therefore limited in its ability to exchange data with other applications

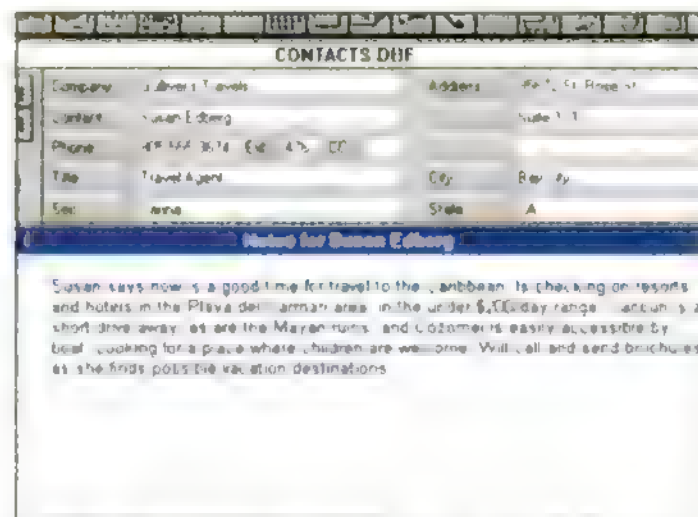
easily. The fact that it can run as a TSR is irrelevant if you work primarily under Windows.

Both products are easy to use. ACT!'s uncluttered Windows interface makes good use of drop-down menus and

icons, and in GoldMine, names of menu bars (Find, Add, Dial, and Schedule, for example) clearly indicate what lies within. GoldMine does not have a graphical interface, but it uses similar conventions and navigational tools. Furthermore, GoldMine's access speed is lightning fast. ACT! has slower access and screen-redraw speeds.

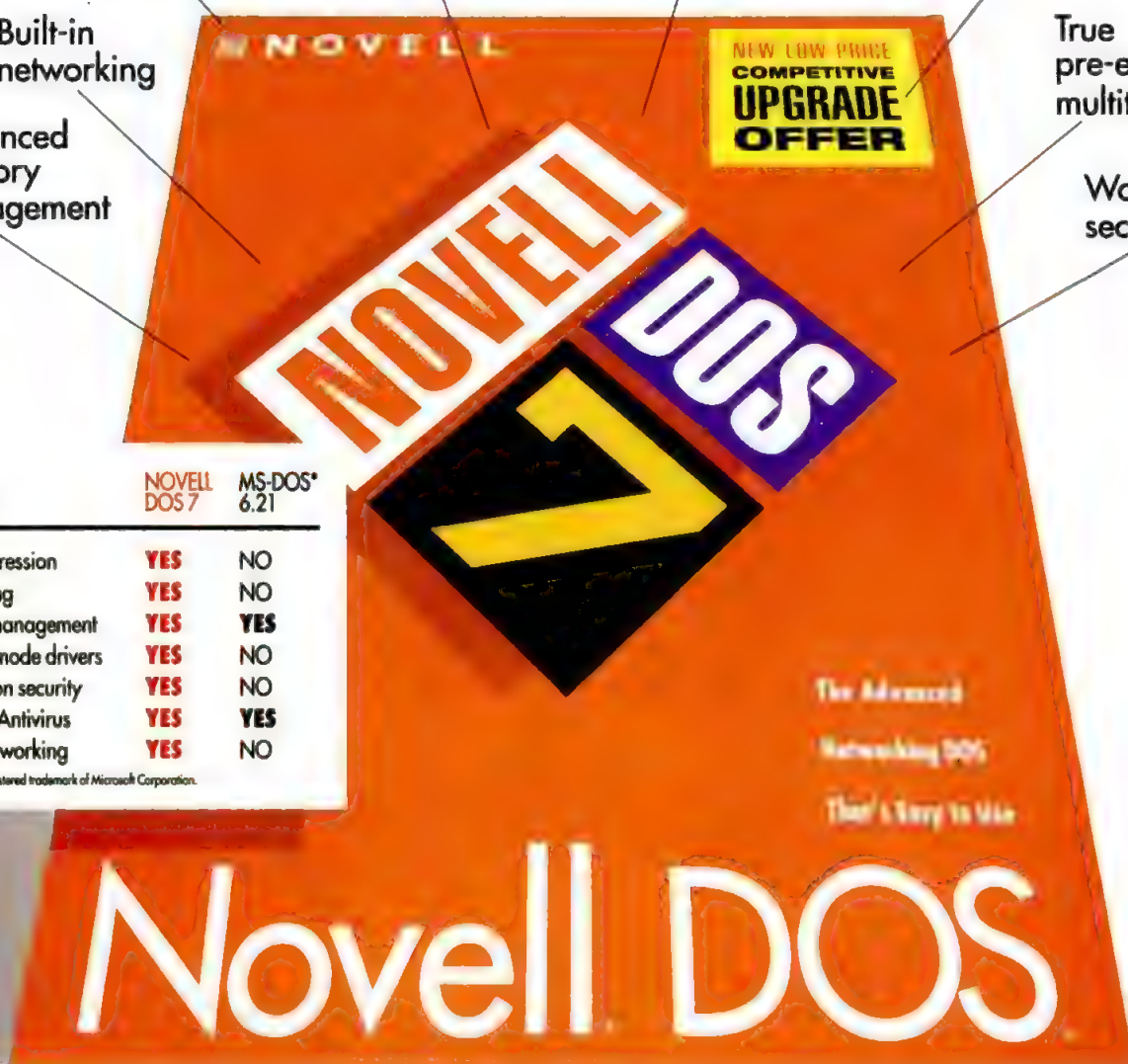
Although ACT! costs \$100 more than GoldMine, GoldMine offers more extras. Most of these are high-end features, such as telemarketing scripts and sales-analysis tools. And its groupware features—such as record-locking, group-scheduling, and user-to-user-chat facilities—are top-notch.

The features that PIMs and contact managers share—contact management, scheduling, and to-do lists—are often more thoroughly implemented in contact managers. As long as you have little random information to manage and you don't mind airtight links between contacts and other elements, you may well find a contact manager that works as a PIM. □



ACT! for Windows lets you keep detailed notes about your personal and business contacts.

This DOS is Boss.



Stacker® disk compression

Unparalleled MS Windows support

100% DOS compatibility

Competitive upgrade offer

Built-in networking

True pre-emptive multitasking

Advanced memory management

Workstation security

NEW LOW PRICE
COMPETITIVE
UPGRADE
OFFER

NOVELL DOS 7

NOVELL DOS

MS-DOS* 6.21

KEY FEATURES	NOVELL DOS 7	MS-DOS* 6.21
Disk compression	YES	NO
Multitasking	YES	NO
Memory management	YES	YES
Protected mode drivers	YES	NO
Workstation security	YES	NO
Backup & Antivirus	YES	YES
Built-in networking	YES	NO

*MS-DOS is a registered trademark of Microsoft Corporation.

The Advanced Networking DOS That's Easy to Use

Novell DOS

New low price! Take advantage of our limited-time competitive upgrade offer on Novell® DOS™ 7 – the world's most advanced, 100% DOS-compatible operating system. With more MS Windows utilities than any other DOS. Plus our exclusive space-saving Stacker disk compression. The productivity of true multitasking. Better memory management with DOS Protected Mode Services. And built-in networking. Sounds good, but you want to know more? Call us and we'll fax you a detailed competitive comparison. Better yet, why not meet The Boss right away and save money, too. See your local reseller today.



CIRCLE 905 ON READER SERVICE CARD

GET THE FACTS BY FAX
OR CALL US AT:
1-800-NETWARE
(REQUEST DOCUMENT
NUMBER 9504)

NOVELL The Past, Present, and Future of Network Computing.

Personal Information Managers

SUITABILITY TO TASK

Ascend, Version 4.0

	POWER	EASE
Contact management	Good	Good
Calendar and scheduling	Fair	Good
Task management	Good	Good
Information management	Good	Good

Boolean sorts, and a reconciliation feature for merging two databases.

Many users will be disappointed with Ascend's appointment scheduler. Following the Franklin system, it increments time in strict 15-minute intervals, and requires much unnecessary scrolling to display your workday. Although Ascend alerts you to appointment conflicts, it does not automatically help you resolve them, and when you cut an appointment, it removes the text but not the associated time block. The calendar's weekly view is informative and lets you change appointment times via a drag-and-drop time line. But you can't add new appointments via the time line or month view.

While Ascend is obviously the PIM of choice for Franklin system devotees, it's also a good choice for those whose needs happen to match its particular strengths. It's also appropriate for those seeking an attractive PIM that's easily mastered right out of the box. Users with rigorous contact management and scheduling needs, however, may want to look elsewhere.

Jensen-Jones Inc.

Commence

BY KATHY YAKAL

Commence, Version 2.1 (\$395), from Jensen-Jones, is undoubtedly one of the most powerful PIMs reviewed here. Beyond offering standard calendars and lists and databases, it keeps you organized by setting up links among things like details and contacts and tasks. It also lets you automate tasks and make extensive use of its notes facility. Yet all of this comes at a high price: namely, a

steep learning curve and an unusual, complicated toolset. Commence's complex features are also offset, though, by its intelligible and flexible interface. You have access to a Command Bar, Status Bar, and View Bar, which you can turn on or off at any time.

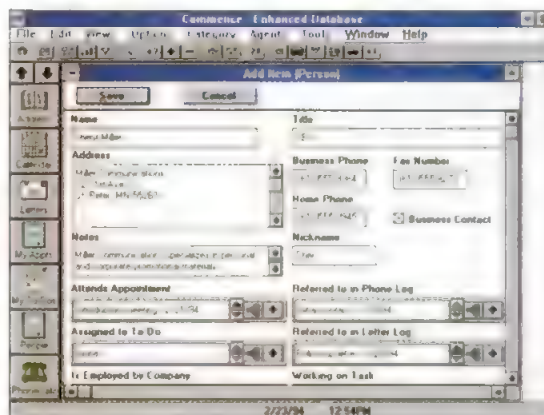
Commence's data-entry screens are unlike those of other products reviewed here. Commence divides data into several categories, including Appointments, Companies, Notes, and Tasks. Categories can be added, deleted, and modified. Each category has its own customizable entry screen. Typical data fields (name, address, and so on) share the screens with connector fields, which are oblong boxes that contain scrolling lists of related data you've already entered or linked from elsewhere. For example, the contact field's connectors include Attends Appointment and Assigned To-Do fields. Click on the Assigns button next to the Attends Appointment box and a complete list of all appointments pops up; click on one and it's assigned. Click on the plus sign to add a new one and scroll through the list of past and future appointments assigned to that individual.

The connector boxes enhance the package's scheduling capacity, particularly in a workgroup setting. In the network version, a grid shows free time slots for all meeting participants, and you can investigate related details, such as location and resources.

Notes fields, too, use the connector boxes to great advantage. While you can store individual notes within records themselves, you can also enter a note as an item, unassociated with a record. The standalone notes field has its own set of connector boxes, so you can still link generic notes to items such as projects, expenses, other notes, and contacts. You can search all notes fields.

For a product that offers so much customizability, Commence is surprisingly inflexible

in its import-mapping features. While you can import ASCII, dBASE, and .DIF files, and add fields to a screen to expand its scope, there's only one built-in field for an address. Yet manually entering new contacts—and editing or copying existing ones—is simple. And if you're maintain-



You can connect every piece of data to another using Commence's connector boxes.

ing your database on more than one computer, Commence's Sync Link feature lets you exchange files while ensuring database synchronization.

Commence helps you track interaction with contacts via dialog boxes that pop up after you've made or received a phone call or sent a letter or fax. Fill in the details

Commence, Version 2.1

Jensen-Jones Inc., Parkway 109 Office Center, 328 Newman Spring Rd., Red Bank, NJ 07701; 800-688-7080, 908-530-4666; fax, 908-530-9827

List price: \$395

Requires: 3MB RAM, 6MB hard disk space, Microsoft Windows 3.0 or later. Server edition 4MB RAM, 10MB hard disk space

In short: One of the most powerful PIMs in this roundup. Commence offers scheduling, task management, and flexible filtering capabilities, and it builds complex connections among the pieces of information stored in your database. It's workgroup capable and offers a powerful Agents feature to automate recurring/trigger-based tasks. The terminology and concepts used may intimidate the average user, however.



446 ON READER SERVICE CARD

and they're logged in the contact's file. Furthermore, a timing feature lets you document a call's duration for billing.

You can set a simple filter to search by field value (name, company, and so on) or item name (a connected field), or you can set a multiple filter to do Boolean searches. You can save filter results and add them to the View Menu and View Bar.

Drag-and-drop is implemented quite well. You can drag an item and drop it onto an icon for any valid action (such as dial, delete, or print). Or you can pick up an item and drop it on the magnet icon, and then change views and drop that same item to a different screen.

One of Commence's best features is its Agent function, which automates tasks that you do regularly, tasks you set triggers to activate, or both. You can, for example, prepare and print a report of the previous day's expenses every morning at 10:00, and print all uncompleted to-do items at 4:00 every afternoon. Thanks to Commence's DDE links, you can perform quite elaborate tasks.

Commence's customizability, connectors, and myriad database views make it an excellent choice for the power user who isn't intimidated by new and formidable concepts, or for any user who needs the package's capabilities and is willing to put in some learning time.

Impulse Software

Computer Organizer for Windows

BY KATHY YAKAL

Impulse Software's Computer Organizer for Windows, Version 3.04, is a minimalist PIM with a minimalist price. The company is giving away the product (you pay a \$9.95 shipping-and-handling fee) until June 30. After the giveaway, the price will be \$29.95. Impulse's clean interface and uncluttered working screen make quick work of managing your contacts, to-do lists, and appointments, but the package lacks the customization and information management tools of the best PIMs.

You can divide your business and personal contacts between Computer Organizer's White Pages and Yellow Pages sections. Database searches are limited;

FACT FILE

Computer Organizer for Windows, Version 3.04

Impulse Software Inc., 1778 N. Plano Rd.,
#112, Richardson, TX 75081; 800-460-2848,
214-437-2849; fax, 214-437-6220



List price: Free until June 30, \$29.95 thereafter

Requires: 2MB RAM, 1MB hard disk space, Microsoft Windows 3.0 or later.

In short: Computer Organizer for Windows offers a basic set of

personal information tools at a bargain-basement price. It's not recommended for an office setting where contact management needs are complex, but at home or in a small, uncomplicated business, it can organize your schedule and contacts efficiently. The company is giving away the product until June 30.

ON READER SERVICE CARD

while you can search most fields, including notes fields, you may only define one phrase, and you can't save the resulting groups. Furthermore, there are no user-definable fields, and contact history isn't automatically logged. Still, you can create logs in Notes (the notepad feature linked to each contact record) using the automatic date-and-time stamp.

You'll have to use your own word processor for corresponding with contacts, but you can easily export single and multiple records (or just copy them to the Windows Clipboard). You can't save groups of records, but you can export them right after you've done a search.

The program's mapping feature, which lets you map the fields in your database to the program's fields, should simplify data import, but we were unsuccessful at bringing in a .CSV database of 1,000 records; only the company names transferred, with a few names scattered in random fields. Entering records manually, though, is no problem. Just fill in the blanks; you can clone a record if it has fields identical to the one you're typing in. The company claims that you can import contact databases with up to 5,000 records.

SUITABILITY TO TASK

Computer Organizer for Windows, Version 3.04

	POWER	EASE
Contact management	Poor	Good
Calendar and scheduling	Fair	Good
Task management	Fair	Good
Information management	Good	Good

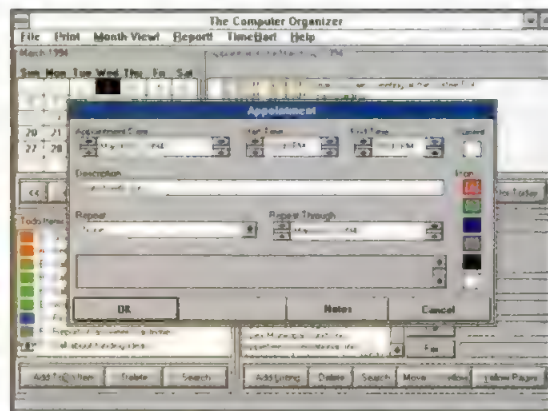
Computer Organizer will handle only very basic task management and scheduling needs, but it handles them capably and quickly. The Add Appointment button pops up a dialog box; you specify the time, the date, any recurring instances, and a description, and add notes. You can then look at your schedule in daily, weekly, and monthly views, clicking on the graphical calendar to add an event.

The To-Do dialog box works similarly, letting you connect each task to a record; you can also auto-dial directly from the dialog box. You can prioritize to-do items, which, like your schedule, appear in a window on the main screen. You cannot schedule multiple contacts.

You can print contact records, to-do items, and schedules, but you can't define a range of dates or records for a print job (though the results of a search can be exported to an ASCII file).

Computer Organizer gives you ample opportunities to file random information. Sizable notes fields are attached to both to-do items and appointments, and a "Notes For Today" button lets you store personal data unrelated to persons or events. All can be searched.

Compared with the other packages



Computer Organizer's Appointment dialog box lays out your options very cleanly.

reviewed here, Computer Organizer falls short by not providing more information management and miscellaneous tools. It does not support DDE or OLE, has no e-mail capabilities, is not network-ready, and lacks flexibility in reporting and printing.

If you need only the most basic personal information management, however, it's hard to argue with Computer Organizer's price. The package is fast enough, understandable enough, and complete enough to handle personal scheduling and task management needs, as well as personal and small-business contact databases.

Okna Corp.

DeskTop Set for Windows

BY STEVE GILLILAND

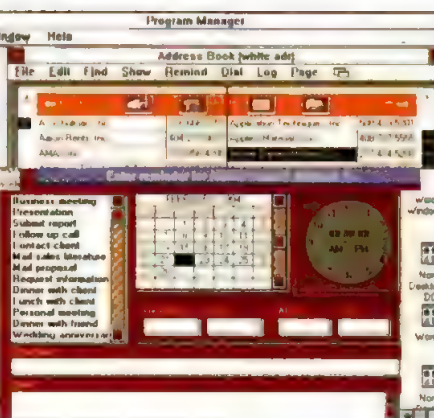
For a considerable time, Okna Corp.'s easy-to-learn, richly equipped DeskTop Set for Windows, Version 4.0c (\$89), has served as a benchmark of sorts. Its speed, flexibility, and common-sense interface have placed the program at the top of the list of easy-to-use organizers. Though per-

haps overdue for a major upgrade, DeskTop Set can still outperform most of its newer competitors.

The opening window of DeskTop Set is straightforward. You select the five modules—Address Book, Calendar, Phone Dialer, Caller ID, and Backup—directly from DeskTop Set's group window. Module screens are well organized and commands are intuitive.

You can drag and drop information from any open screen to any other. For example, you drop a name from the Address Book into a Calendar time slot and the appointment is made. A little telephone icon even reminds you of the source of the appointment. You can't create custom screens, but you can create calendars for different purposes—business or personal affairs, for instance. In addition, there's no limit to the number of open screens.

Importing data into the Address Book



Reminders are easily scheduled from within DeskTop Set's address book. You can set a time by clicking on the clock.

module is a snap, mostly because DeskTop Set has 79 contact fields, and 32 of them are user-configurable. DeskTop Set imports a wide array of formats: .CSV, .DBF, .DIF, Tandy DeskMate 3.0, .WKS, .WK1, .WK3, and more. With the right serial cable, purchased from the palmtop manufacturer or a third party, you can export to Sharp Electronics Corp.'s Wizard, a Casio B.O.S.S., or Hewlett

LABELS FOR THE JET SET.



You look marvelous.

The label on your envelope communicates a lot more than an address. Now Avery Ink Jet Labels can make that first impression a lasting one.

New Avery Ink Jet Labels print crisp and clean, in black or in color, from your Hewlett Packard DeskJet, Canon® Bubble Jet™, or other popular ink jet printer. Built-in Avery templates in WordPerfect®, Microsoft® Word, and other leading software programs make them easy to format. Choose from a variety of white or clear addressing and shipping labels.

Call **1-800-462-8379** for a FREE sample pack. Joining the Jet Set has never been easier.



NEW AVERY INK JET LABELS

The best way to organize people, places and things.

Get more done in less time and manage your contacts and activities more efficiently. Introducing WordPerfect® InfoCentral™, the intelligent information manager.

Using iConnect™ technology, InfoCentral connects information about people, places, things and events. It then displays the information in an easy-to-read outline that lets you see it from any perspective.

Information from any Windows application can be connected to items within InfoCentral. You can even manage your contacts and "to-do" lists using InfoCentral's calendar and address views.

InfoCentral also includes information

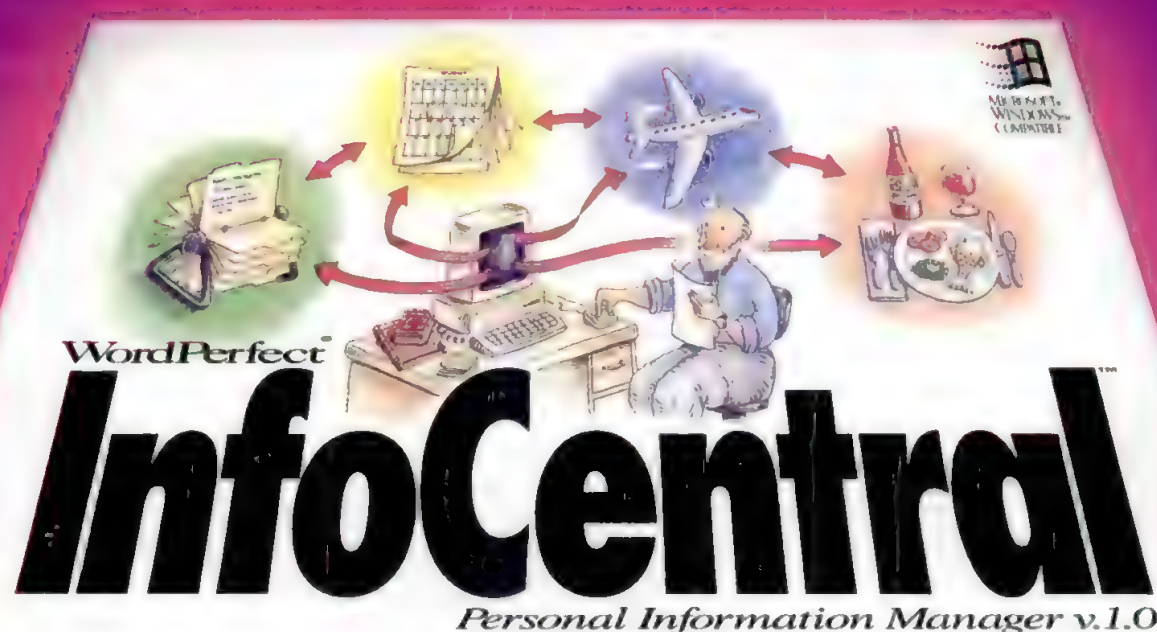
bases (iBases™) on consumer goods, computer products, travel, and wines.

InfoCentral. It's one of the many products you'll find on Main Street, the new family of easy-to-use software from WordPerfect Corporation.

Call 1-800-526-5173 or see your local retailer for more information.

WordPerfect®
Main Street.™

Bringing the best home.



Packard Co.'s HP95L.

For manual entry of new names, any Address Book item can be linked to any other, so it's easy to add new entries with common data fields. Furthermore, you can merge Address Book files to synchronize different copies of DeskTop Set, and import calendar events from the Windows Calendar, Lotus Organizer, and Microsoft Schedule+.

DeskTop Set can find Address Book data by phone number or category. It can also search phonetically—an uncommon feature, at least among PIMs.

The phone log notes call duration and lets you select several types of calls—internal, business, personal, or billable, for example. It permits up to 16K worth of notes per call. You can search the phone log and notes fields.

DeskTop Set offers a Caller ID module, though your system and phone company must support it. Caller ID can recognize a caller's phone number and quickly find the record for that person, so you can take notes on the call with ease. The package also includes a limited word processor, best for form letters merged with contact records.

SUITABILITY TO TASK

DeskTop Set for Windows, Version 4.0c

	POWER	EASE
Contact management	Good	Excellent
Calendar and scheduling	Good	Excellent
Task management	Good	Good
Information management	Good	Good

Versatile appointment scheduling is DeskTop Set's forte. Besides dragging and dropping from the Address Book, you can click on a time slot in a daily calendar view and drag the time line to set appointment duration. You can select start and end times and user-defined event-description phrases, and even schedule an event via a sliding time bar.

Appointments can be linked to contacts and calendar items can be linked to the to-do list. Unfortunately, there is no conflict warning, and setting recurring tasks is somewhat awkward.

You can, however, specify either a date range or the number of recurrences you need.

To-do lists can be easily set up and prioritized, and each entry can have a note field. To-do items can be linked to an Address Book name or attached to outside files. You can search to-do lists by priority and date.

DeskTop Set is better at contact management and task scheduling than handling random pieces of information. Even so, if you want to associate unstructured data with a contact, you can use the Address Book module, with its 32 user-configurable fields, unlimited categories, and large notes fields. Also, you can search notes by date or category.

DeskTop Set also lets you attach an unlimited number of files to each record and launch and edit Windows application files from within the package (though there's no OLE support). Files can be attached to the to-do lists, but not to your appointments. There is no provision for automatic logging of contact activity.

DeskTop Set offers extensive use of drag-and-drop and versatile appointment scheduling and to-do-list management. And it's the only product here that offers an interface for Caller ID. For those whose personal information already has some structure, DeskTop Set is an excellent choice.

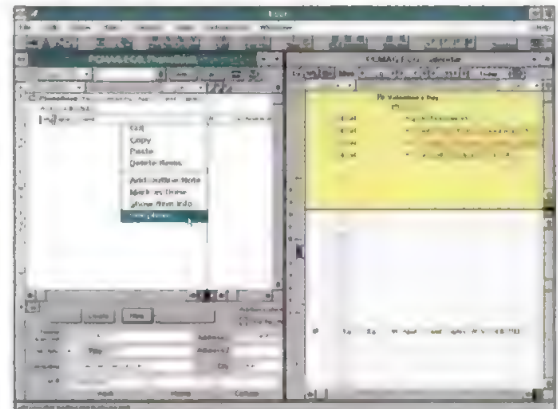
Arabesque Software Inc.

ECCO Professional

BY GREGG KEIZER

Looking more like a spreadsheet-oriented outliner than an electronic planner, Arabesque Software's \$395 ECCO Professional, Version 1.1, is an extraordinarily flexible program that lets you view information in an almost unlimited number of ways. And although that flexibility comes at a cost—ECCO is tough to kick start if you immediately delve into its advanced features—its fast phone book searches and quick links between contacts and appointments make it an impressive PIM right out of the box.

ECCO uses an outline metaphor, with items that can be moved and ranked hierarchically by dragging and dropping. You use columns, which give ECCO its spreadsheetlike appearance, to hold additional information. You can label and format columns, and assign styles to them—from text to dates. You can build and view



You can make calls and tile ECCO's phone book and calendar by picking from a menu called up with a right-button click.

Folders, which are essentially outlines (and ECCO's information depositories), with clicks and drags of the mouse. ECCO's toolbar is highly malleable and able to hold any action you select from a menu. The program does rely a bit too heavily on the mouse, offering an incomplete range of keyboard shortcuts, but several templates help you ease your way into more-complex features.

Phone book fields (there are 20) are preset; you can't alter or add to them, but you can add columns to store addi-

EDITOR'S CHOICE

DeskTop Set for Windows, Version 4.0c

Okna Corp., 12 Rt. 17 North, #212,
Paramus, NJ 07652; 800-438-6562,
201-909-8600; fax, 201-909-0688

List price: \$89
Requires: 4MB RAM, 3MB hard disk space, Microsoft Windows 3.1 or later

In short: DeskTop Set is efficient at scheduling and gathering contact information, and it provides adequate task management. You can input appointments and to-do tasks from almost anywhere in the program. One especially attractive feature is that it lets you attach outside files to contacts in the Address Book as well as to items on a to-do list.

 ON READER SERVICE CARD

tional information. Each record holds five phone numbers and two addresses. The process of adding new contacts is partially automated: ECCO copies all data in a contact to a record, where you can make changes. It's quite easy to import a text or comma-delimited database; ECCO's mapping feature lets you assign fields flexibly.

You can manually log any call, but there's no list of possible responses to choose from (although you can create columns to hold the equivalent). All other completed events, from appointments to tasks, are logged separately to an outline view; if they were originally linked to a name, they remain so in an outline. You can search the phone book by name, company, or any number of the default fields.

ECCO's calendar, available for viewing in either list or graphical format, details task priorities and appointment conflicts. You build links between the phone book and calendar by dragging a contact to the calendar, or by clicking on or entering data in one of the phone book's columns. To change an appoint-

ment, you can drag it into another time slot, expand its length, or click on a clock-style part of a dialog box. Still, ECCO's interface can be awkward; you have to go through several steps to make appointments, and the text in the weekly and monthly views does not wrap.

ECCO's outlines can help you handle items such as calls and projects to be completed. You link outline items to the calendar and contacts, and contacts in an outline can be dialed from within that outline. And it's easy to cross-reference data: You can drag a to-do item from the calendar into a project folder or a contact folder, for instance.

ECCO's outlines also handle less-structured information—and an unlimited amount of it. You can embed OLE objects in any outline, launch documents, and sort on any outline column. Text-string searches are fast, and you can direct the results to an outline view. A sophisticated filtering system lets you create, store, and recall alternative views of any outline, including those that use Boolean operators (such as Equal To and Greater Than/Equal To) across multiple fields.

There's also the Shooter feature, a copy-and-paste tool that appears at the top of every Windows screen when ECCO is open. It lets you copy data to and from ECCO and other applications with a couple of clicks.

While ECCO allows data files to be shared over a network, it is not capable of handling workgroup chores. Still, it can deal with simple project tasks if you work with the outlines; the latter can include Gantt-style charts for tracking dates. And beware: ECCO can be a system-resource glutton, consuming as much as 20 percent of available resources.

Such shortcomings—and the initial difficulty you'll have getting familiar with its unique approach—are the price you pay for ECCO's power and flexibility. This is a PIM that's perfect for power users.

SUITABILITY TO TASK		
ECCO Professional, Version 1.0		
	POWER	EASE
Contact management	Good	Good
Calendar and scheduling	Excellent	Good
Task management	Good	Good
Information management	Excellent	Good

Chronologic Corp.

Instant Recall for Windows

BY DON WILLMOTT

Chronologic Corp.'s Instant Recall for Windows, Version 2.1, combines the best features of PIMs, database management, and text searching to give you fast, free-form access to all your information. If you want lots of contact management features (user-definable fields and built-in faxing and word processing), look elsewhere: Instant Recall (\$129) is first and foremost a PIM. A network version, Instant Recall Office (\$1,495 for five users), handles group scheduling, letting you send notes and meeting invitations across the e-mail system your company is already using.

Instant Recall's entry screens for new appointments, addresses, and tasks are clear and straightforward. Unlike many other PIMs and most contact managers, Instant Recall doesn't provide user-definable fields for your address book listings; instead you can assign up to 250 categories to any one entry. That way, you can quickly search for anything, anywhere. But you'll have to go through a multistep process to find all the Smiths in California, for example—first searching for the name *Smith*, then searching for the string *CA*. You can run quick universal searches for any text string or whole word, and index every word in a database to speed up searches. Search results appear on the screen in which you requested them, so contact searches appear in the address book.

FACT FILE

ECCO Professional, Version 1.1

Arabesque Software Inc., 2340 130th NE, Bellevue, WA 98005-1754; 800-457-4243, 206-869-9600; fax, 206-885-0127

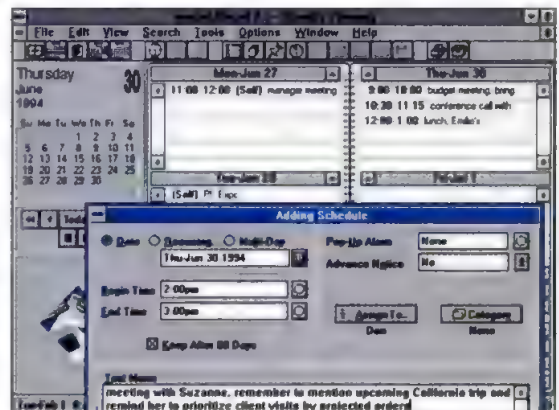
List price: \$395.

Requires: 2MB RAM, 3MB hard disk space. Microsoft Windows 3.1 or later.

In short: Arabesque Software's ECCO Professional uses a unique outline approach to managing

information. You can view ECCO's phone book and calendar easily, and both modules handle the basics of information management elegantly and efficiently. ECCO's customizability in particular makes it perfectly suitable for those seeking a flexible PIM. This is a PIM that is particularly appropriate for power users.

449 ON READER SERVICE CARD



In Instant Recall, you simply point and click to select times for events.

No one else brings



All the selection. All the service.

Announcing CompUSA Direct!

Get the buying power of the world's largest computer superstores in your home.

We're the world's largest chain of computer superstores. In fact, more people buy computers and software from us than anyone else. And now, CompUSA Direct offers you the same incredible selection, guaranteed low

prices, super service and super support—right in your own home. Just pick up the phone and call **1-800-CompUSA** any time of the day or night and you can have it all!

Guaranteed Low Prices.

We shop our competitors all the time to make sure no mail order competitor



beats our CompUSA Direct price. Our prices aren't just guaranteed... they're verified.*

Over 5,000 Products.

We offer the most incredible selection of computer products imaginable—including hardware, software, printers, accessories, furniture and more. When it comes to buying power, other direct companies don't even come close.

The Most Name Brands.

No one else offers all these name brands. Here's just a

sample: IBM, Compaq, Toshiba, NEC, Packard Bell, Dell, Texas Instruments, Canon, Epson, Borland, Sharp, Claris, ATI, Okidata, U.S. Robotics, Sony, Lotus, Panasonic, Microsoft, WordPerfect, Hewlett-Packard.



*If you find a lower price in the current issue of this magazine we'll beat it. Guaranteed. Offer good on all new in-the-box products of the same brand and model number that are available in stock from any other authorized mail order competitor. It does not apply to competitors' one-of-a-kind or other limited quantity offers or when a bonus or free offer is included in the purchase. CompUSA Direct prices are available through mail order only.

**Technical support available through your nearest CompUSA Superstore Technical Service Center. On-site service is available within the continental U.S. only.

all this to your door!



All at guaranteed low prices.

Super Service. Super Support.

No one else offers complete technical support like CompUSA Direct. Plus, an extended warranty, in-store repair and on-site service are also available.**

Best Business Support.

CompUSA's Corporate Division is your best business connection. Your company gets a personal Account Representative to handle all your business needs, plus quick delivery, easy ordering, guaranteed satisfaction

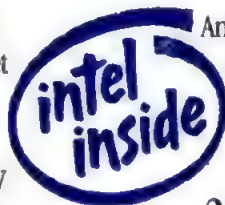
and more. We'll even help you set up a network.

Easy 30-Day Return Policy.

Returns are not a problem, with our 30-day money back guarantee.*** Plus, there's no credit card surcharges or re-stocking fees for returned products.

Custom System Configuration.

Order it your way. Just tell us what you want and we'll customize a system for you right over the phone.



And look for the Intel Inside® symbol on your quality computer products.

24-Hours A Day. 7 Days A Week.

CompUSA Direct is always ready to take your order. For a FREE catalog call **1-800-CompUSA**. International orders call 1-214-888-5770.

Call Today
for a Free
Catalog



COMP USA DIRECTSM

1-800-COMP USA



CIRCLE 144 ON READER SERVICE CARD

***Defective merchandise may be replaced with the same item only. Original packaging and proof of purchase is required to return any merchandise. All Hayes modems and laser printers, and some other printers, monitors and laptops must be sent to authorized service centers. The Intel Inside logo is a registered trademark of Intel Corporation. All other trademarks belong to their registered owners. For international orders, call 1-214-888-5770. CompUSA Direct is a registered servicemark of CompUSA Inc. CompUSA Direct, 15167 Business Avenue, Dallas, TX 75244.

SOFTWARE

Personal Information Managers

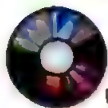
Instant Recall isn't well suited to hard-core contact management. Its address book is basically for addresses only, though you can use the large notes field to type in anything you want. Some activities, such as phone calls, can be automatically logged, and a date-and-time stamp helps you create history logs. The package also has fairly good mail-merge connections to Windows word processors.

Instant Recall's daily, weekly, and monthly calendars are good-looking and easy to print out. You can't separate the day's appointments with a blank space in the weekly view to give yourself a graphical representation of the day's events—all the appointments just stack up—but the schedule view gives you a graphical representation of your time commitments.

The day view shows you not only your



Printer Port Connections Are The New Tools Of The Trade.



Once you discover just how easy it is to install a backpack CD-ROM drive to your computer, you'll never be inconvenienced by conventional installation methods again. Just plug backpack into your computer and you're ready to go. No interface cards, hardware conflicts or expansion slots required. Because of its unique printer port interface, backpack fits all IBM PC compatibles and portables regardless of CPU speed. In addition, a built-in audio circuit with both headphone and line output jacks allows for connection of sound cards or Hi-Fi. You can run thousands of your favorite multimedia programs and view Kodak™ Photo CDs too, with CD-ROM backpack. Compact and versatile, you can expect backpack to go wherever you go, bringing with you the wealth of information CD-ROM storage makes possible. Printer pass-through is included. Tape drive, hard drive and diskette backpack drives are also available. Call today for ordering information and a dealer nearest you.



backpack
CD-ROM Drive

MicroSolutions

132 W. Lincoln Hwy.
DeKalb, Illinois 60115
Telephone 815.756.3411 Fax 815.756.2928
Call Toll Free 800.293.1214

CIRCLE 855 ON READER SERVICE CARD



Photo CD symbol is a trademark used under license

SUITABILITY TO TASK

Instant Recall for Windows, Version 2.1

	POWER	EASE
Contact management	Good	Good
Calendar and scheduling	Excellent	Good
Task management	Fair	Good
Information management	Fair	Good

schedule but also your to-do list (it can be prioritized in a number of ways) and your overdue tasks, which roll over automatically from day to day.

Instant Recall Office does a good job of keeping a small workgroup running smoothly. The person with the duties of manager or administrator sets up all the users, and can share address book and scheduling information with other workgroup members. Various file- and record-locking schemes help control who can change what.

The best part of Instant Recall Office is its group scheduling. By piggybacking on the VIM- or MAPI-compliant e-mail system already on your LAN, you can arrange meetings or assign tasks to others in the group. You send group members e-mail messages and invitations right from the program, and they respond the same way.

Switching to Instant Recall from

FACT FILE

Instant Recall for Windows, Version 2.1

Chronologic Corp., 5151 N. Oracle, #210,
Tucson, AZ 85704; 800-848-4970, 602-293-3100; fax, 602-293-0709



List price: \$129.

Requires: 2MB RAM, 3MB hard disk space, Microsoft Windows 3.1 or later

In short: The relatively free-form Instant Recall gives you fast access to your addresses

and appointments by letting you search quickly for any word or text string. The program helps small workgroups share databases and set up meetings via the LAN e-mail already in use. Workgroups seeking a low-maintenance way to stay in touch and share contact data will find Instant Recall Office a good tool.



ON READER SERVICE CARD

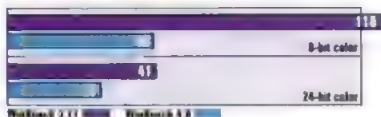
MGA 64-Bit Power Graphics

The proven series of 64-bit graphics accelerators



What's all the buzz about the bees?  Matrox MGA revolutionized graphics by introducing the very first 64-bit accelerator for the PC. One year later, the competition is still swarming to catch up. Why wait for their 64-bit promises? Whether you work in Windows, CAD or multimedia, Matrox MGA has the proven 64-bit solution for all your graphical needs today!

110 Million WinMarks



Whiz through your Windows applications with Matrox MGA. MGA's 64-bit datapath has consistently outperformed the competition, and does it again with 110 million honest WinMarks using newer Pentium-based technologies.

True Color Acceleration

MGA is the accelerator of choice when working in true color according to PC Magazine and Windows Sources. Why? MGA processes all 16.7 million colors once in VRAM, instead of the competition's three 8-bit passes through VRAM or even DRAM. To add even more power, MGA's VRAM block-write feature moves entire blocks of pixels instead of only one pixel at a time.

Ultra High Resolutions and Refresh Rates

MGA offers 120 Hz flicker-free refresh and ultra high resolutions up to 1600 x 1200 for displaying two full tabloid size pages. And MGA Ultima Plus 200 provides rock solid 80 Hz refresh at 1600 x 1200 in 65K colors. Another industry first!

Real-Time 3D

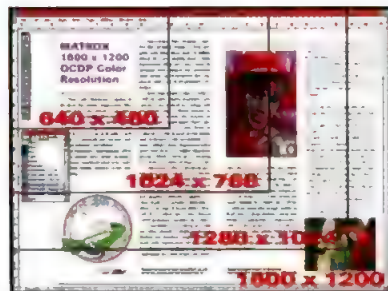
MGA transforms your PC into a 3D workstation for under a \$1000. MGA's powerful real-time 3D acceleration enables users to instantaneously render wireframe models to Gouraud shaded at resolutions up to 1280 x 1024 in 16.7 million colors, which is one of the reasons why Byte Magazine awarded MGA Impression with Best CAD/CAM accelerator.



Windows Productivity Features

MGA's feature-rich control panel offers:

- **Instant Modeswitch™** on-the-fly resolution and color depth switching without exiting Windows. Another industry first!
- **Pixel Touch** hardware pan and zoom
- **QCDP™** true color simulation in 8 and 16-bit at resolutions up to 1600 x 1200
- **Virtual Desktop** sizes up to 1600 x 1200
- **VideoView** full screen VFW playback at 30 frames per second
- **DPMS** automatic monitor power down



DynaView 2D/3D Features

MGA is bundled with DynaView, Matrox's own powerful display list drivers for AutoCAD offering features such as, Dynamic Bird's Eye and Spy Glass Views, Windows-like Scroll Bars and Reconfigurable Iconic Menus, as well as dual display drivers for MicroStation.



Starting at
\$599

MGA Ultima Series

- 2 MB VRAM and 2 MB upgradable to 4 MB with MGA Ultima Plus (VL or PCI)
- Hardware accelerated 24-bit color and 2D CAD
- 1600 x 1200 in 256 and 65K colors
- Up to 1152 x 882 in 16.7M colors
- Flicker-free 120 Hz refresh



2MB PCI
\$649

New MGA Ultima VAFC

- 2 MB VRAM PCI Bus
- Supports VAFC (VESA Advanced Feature Connector)
- "Video Ready" capabilities
- 32-bit connector for increased video datapath



3MB VL/A
\$999

MGA Impression Series

- 3 MB VRAM with optional 2 MB DRAM
- 4.5 MB VRAM with optional 4 MB DRAM
- Integrated 3D graphics engine for real-time Gouraud shading
- 1600 x 1200 in 256
- Up to 1280 x 1024 in 16.7M colors
- Flicker-free 120 Hz refresh

MGA Windows Power Drivers

Matrox's reputation for reliable hardware and solid drivers is a result of nearly two decades of proven performance in developing graphics solutions for companies such as Hewlett Packard and Sun.

Matrox MGA provides support for:

- Windows 3.1
- Windows NT
- OS/2 PM 2.1
- Unix X-Windows
- PCI, VL, ISA, MCA

Shipping Now!

For more information, please call:

1-800-361-1408

Matrox Electronic Systems Ltd.

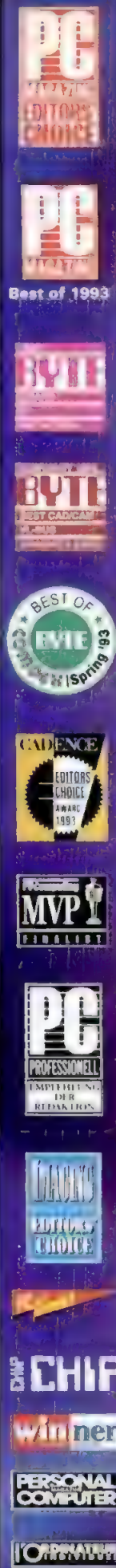
1065 St. Regis Blvd, Dorval, QC, Canada, H9P-2T4
Tel: 514-685-2630 Fax: 514-685-2853

WinMark scores based on a Pentium 90, 50 MHz with MGA Ultima, PCI, 4 MB, 1024x768. ©1994 All rights reserved. Matrox, Matrox MGA, Matrox QCDP, Matrox Instant Modeswitch are registered trademarks of Matrox Electronic Systems Ltd.

M A T R O X
MGA™
POWER GRAPHICS

See us at WindowsWorld'94
CIRCLE 124 ON READER SERVICE CARD

matrox



another PIM can be a challenge. The program is finicky about the formatting of the comma-delimited ASCII data you might try to import, and messiness can ensue. If you use a hand-held device like Hewlett-Packard Co.'s HP100LX or Sharp Electronics Corp.'s Wizard, you can connect to the program through IntelliLink for \$69.95.

Instant Recall's large note fields and lack of user-definable fields make it less like a database and more like a big, searchable address and appointment book full of notes in the margins. If that's the way you like to work, then this program is for you. Workgroups looking for a relatively low-maintenance way to stay in touch and share contact data will also find Instant Recall Office a good tool.

Lotus Development Corp.

Lotus Organizer

BY HILLARY RETTIG

Lotus Organizer, Release 1.1, offers exceptional ease of use. Even novices can get up to speed quickly with this \$149 program, thanks to its streamlined command structure, excellent manuals and on-line help, and friendly loose-leaf-notebook design metaphor (you access modules by clicking on divider tabs). In addition, Lotus Organizer features workgroup scheduling over networks using cc:Mail. Once familiar with the program, however, many users will probably find themselves chafing at its limitations.

The program's Achilles' heel is its Address List module, which permits entry of only one address and two telephone numbers per contact—definitely inadequate in this age of home offices, car phones, and fax machines. It also provides only a single, multiline field for recording contact addresses—a serious impediment to mail-merges and data import and export. Moreover, you are limited to only two user-definable fields. And finally, it lacks fields for recording contacts' middle names and corporate

departments.

The Address List offers searching, sorting, dialing, reporting, and call-logging abilities; they tend to be perfunctory, however. The program does not support Boolean searches, and you can sort only by company, last name, ZIP code, and type. There are very few dialing formats, and you can edit only report layouts, not the information within. The report printer, though, is both robust and quite easy to use, and the program ships with dozens of predefined formats.

Lotus Organizer's other modules are better. The program offers a comprehensive scheduling function that spans four modules: Appointments (a calendar offering informative daily and weekly—but not monthly—views), To Do, Anniversaries (for recording annual events), and Yearly Planner (a miniature project manager).

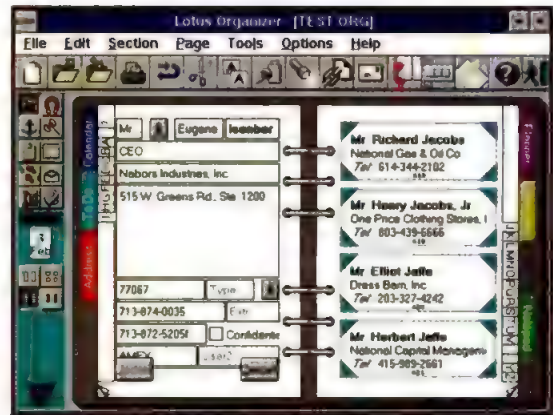
These four modules are well integrated, and each offers two exceptional features: a "grow-and-shrink" graphical time-entry device that is superior to other programs' time lines and an elegant facility for entering and editing recurring events. Even here, however, we noticed

some decided insufficiencies: The Appointments module won't let you set alarms on "snooze" or schedule overlapping events.

Lotus Organizer's Notepad is excellent. It's a flexible

and creativity-enhancing tool that lets you create pages containing text, images, and data—anything that can be copied via the Windows Clipboard—and then organize them into sections and even volumes. You can use the Notepad to produce an entire on-line book, including illustrations. You can link elements in the Notepad to any section—except for the Yearly Planner and Anniversaries sections, which can't be linked to the rest of the program.

Finally, although Lotus Organizer does have a global-search function, the



Lotus Organizer's Address List module—its weak point—stores only a limited amount of contact information.

program's modules are not well integrated. In particular, appointments cannot be generated from the Address List, although addresses and appointments can be linked, hypertext-fashion, after they're created. The program also lacks a reconciliation feature for merging two databases.

Lotus Organizer is a fun program and might be the just the right choice for those with modest information management needs. It might also be a good selection for networked users with strong scheduling needs. It has serious limits in both power and flexibility, however. Many users may want to look elsewhere.

SUITABILITY TO TASK

Lotus Organizer, Release 1.1

	POWER	EASE
Contact management	Fair	Excellent
Calendar and scheduling	Good	Excellent
Task management	Good	Good
Information management	Fair	Good

FACT FILE

Lotus Organizer, Release 1.1

Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142-1295; 800-343-5414, 617-577-8500; fax, 617-693-3899

List price: \$149.

Requires: 2MB RAM (4MB recommended), 4MB hard disk space, Microsoft Windows 3.0 or later. Group scheduling requires cc:Mail for Windows, Version 1.1, and networks using NetWare.

In short: Lotus Organizer offers ease of use at the expense of power and flexibility—not an entirely successful transaction. Although users will appreciate its excellent interface, documentation, and on-line help, they may find its limitations crippling. The Address List module—which permits entry of only one address and two phone numbers per contact—is particularly weak.



ON READER SERVICE CARD



Use it wherever you think best.



*Tested, warranted and supported by manufacturer to ThinkPad Compatibility Standards.

Add to it without thinking twice.

You didn't have to think twice about buying your ThinkPad®. Now, a new program from IBM® will make buying enhancements just as easy.

Say you want a modem, memory, cellular interface or PCMCIA card. All you have to do is make sure it has the ThinkPad Proven™ emblem. It's the manufacturer's statement that a product is tested, warranted and supported by the manufacturer to ThinkPad compatibility standards.*

The ThinkPad Proven emblem is an extension of the commitment to quality and service you've come to expect from IBM.

To receive more information by fax, simply phone 1 800 426-3395 and request document 11900.



*Warranty, service and support for non-IBM products are provided directly to you by the non-IBM manufacturer, supplier or publisher of the product. IBM makes no representation or warranties regarding non-IBM products referenced in this publication. ThinkPad and IBM are registered trademarks and ThinkPad Proven is a servicemark of the International Business Machines Corporation. © 1994 IBM Corp

SOFTWARE
Personal Information Managers

► **S U M M A R Y O F F E A T U R E S**

Personal Information Managers



Products listed in alphabetical order

■ = YES □ = NO

	Arcadia Workplace Companion	Ascend	Commence	Computer Organizer for Windows	DeskTop Set for Windows	ECCO Professional	Instant Recall for Windows	Lotus Organizer
Interface	OS/2	Windows	Windows	Windows	Windows	Windows	Windows	Windows
List price	\$179.95	\$199.95	\$395.00	Free until June 30, \$29.95 thereafter	\$89.00	\$395.00	\$129.00	\$149.00
Contact Management								
Number of phone fields in standard record	8	5	3	4	8	5	6	2
Assigns categories to entries	☐	■	■	■	■	■	■	■
Maximum number of categories	N/A❶	Unlimited	300	2	128	250	1,000	2
Searches:								
By first name	■	■	■	■	■	■	■	■
By last name	■	■	■	■	■	■	■	■
By organization	■	■	■	■	■	■	■	■
By ZIP code	■	■	■	■	■	■	■	■
By area code	■	■	■	■	■	■	■	■
By keyword	☐	■	■	■	☐	■	■	■
Phonetically	☐	☐	☐	☐	■	■	■	☐
Other options	None	All contact fields	Nickname, title	None	None	Column	Assignee, category, due date, text	Category, position, title, type
List view available	■	■	■	■	■	■	■	■
Attaches notes and text	■	■	■	■	■	■	■	☐
Import and export formats supported	ASCII, .CSV	ASCII, .CSV	ASCII, .DBF, .DIF	ASCII	ASCII, .CSV	.CSV	ASCII, dBASE	ASCII, dBASE
Phone dialer	■	■	■	■	■	■	■	■
Logs phone calls automatically	■	■	■	☐	☐	■	■	■
Logs duration of calls	■	■	■	☐	■	■	☐	■
Attaches notes to phone log	■	■	■	■	■	■	■	☐
Call reminder and alarm	■	■	■	■	■	■	■	■
Calendar/Schedule Management								
Adjustable workday and workweek	■	■	■	■	■	■	■	■
Adjustable schedule increments	■	☐	■	■	■	■	■	■
Adjustable date format	■	☐	■	☐	■	■	■	☐
Prescheduled holidays	■	■	☐	☐	■	■	☐	☐
Event alarm can be set for advance warning	■	■	■	■	■	■	■	■
Daily and weekly appointment view	■	■	■	■	■	■	■	■
Monthly appointment view	■	■	■	■	■	■	■	☐
Yearly appointment view	☐	☐	■	☐	■	☐	☐	☐
Schedules recurring appointments	■	■	■	■	■	■	■	■
Daily, weekly, and monthly	■	■	■	■	■	■	■	■
Biweekly	■	■	■	■	■	■	■	■
Mth weekday of month	■	■	■	■	■	■	■	■
Other options	None	Every <i>n</i> th day	Every <i>n</i> th week, every weekday, yearly	Every <i>n</i> th day, yearly	None	Every <i>n</i> th month, every weekday	Quarterly, yearly	None
Finds free time	☐	■	■	☐	■	☐	■	■
Displays free and busy time graphically	■	■	■	■	■	■	■	■
Conflict alert/resolution	■ ☐	■ ☐	■ ☐	■ ☐	■ ■	■ ☐	■ ☐	■ ■
Searches appointment text	☐	■	■	■	■	■	■	■
Task/Project Management								
Assigns priority levels to tasks	■	■	■	■	■	■	■	■
Carries unfinished tasks forward	■	■	■	■	■	■	■	■

N/A❶—Not applicable: The product does not have this feature.

SOFTWARE
Personal Information Managers

CONTINUES

Merlin	On Schedule for Windows	PackRat	Sharkware	Time Planner Deluxe	Winfo Pro
Windows	Windows	Windows	Windows	Windows	Windows
\$59.95	\$99.95	\$395.00	\$189.95	\$59.00 until June 30, \$129.00 thereafter	\$49.95
8	6	50	4	6	7
☐	☒	☒	☒	☒	☒
N/A ¹	12	Unlimited	Unlimited	3,000	Unlimited
☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☐	☒
☐	☐	☐	☐	☐	☐
None	All contact fields	All contact fields	None	None	Any field in database
☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒
Sharp's Wizard	ASCII, .CSV	ASCII, .CSV, dBASE	ASCII, dBASE, .CSV	ASCII, .CSV	ASCII
☐	☒	☒	☒	☒	☒
☐	☒	☒	☒	☒	☐
☐	☒	☒	☒	☒	☐
☐	☒	☒	☒	☒	☐
☐	☒	☒	☒	☒	☐
☐	☒	☒	☒	☒	☐
☐	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☐	☒	☐	☐	☐	☒
☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
None	None	Quarterly	Yearly	None	None
☒	☐	☐	☐	☐	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☐

► SUMMARY OF FEATURES

								
Products listed in alphabetical order ■ = YES □ = NO	Arcadia Workplace Companion	Ascend	Commence	Computer Organizer for Windows	DeskTop Set for Windows	ECCO Professional	Instant Recall for Windows	Lotus Organizer
Task/Project Management (continued)								
Assigns tasks to others	□	□	■	□	■	■	■	□
Assigns categories to tasks	□	■	■	■	□	■	■	□
Attaches notes to task entries	■	■	■	■	■	■	■	■
Keeps history of tasks after completion	■	■	■	■	■	■	■	■
Schedules recurring tasks	□	■	■	□	■	■	■	□
Daily, weekly, biweekly, monthly, and on the <i>n</i> th weekday of month	N/A ¹	■	■	N/A ¹	■	■	■	N/A ¹
Other options	N/A ¹	None	Every <i>n</i> th week, weekdays, yearly		None	Every weekday, every <i>n</i> th month	Quarterly, yearly	N/A ¹
Project-management module	□	□	■	□	□	■	■	■
Breaks tasks down into separate steps	N/A ¹	N/A ¹	■	N/A ¹	N/A ¹	■	■	■
Gantt-type graphical depiction of projects	N/A ¹	N/A ¹	■	N/A ¹	N/A ¹	■	□	■
Miscellaneous-Information Management								
Memo and notes entries:								
Maximum number	Unlimited	Unlimited	18,000	Unlimited	Unlimited	Unlimited	65,000 (per database)	Unlimited
Size limit (characters)	Unlimited	64,000	30,000	Unlimited	Unlimited	32,000	65,000	■
Searches by text string	■	■	■	■	□	■	■	■
Indexes selected keywords/all words	□□	■□	■□	■■	■□	□□	■■	■■
Assigns categories to notes	■	■	■	□	■	□	■	■
Organizes information in folders/outlines	■□	■□	■□	□□	□□	■■	□□	■□
Creates links or associations between items	□	■	■	■	□	■	■	■
Maximum number of links	N/A ¹	Varies	600	1	N/A ¹	250	Unlimited	Unlimited
Expense tracking	□	□	■	□	□	□	□	□
Networking								
Network version available	□	■	■	□	□	□	■	■
Shared name-and-address database	N/A ¹	□	■	N/A ¹	N/A ¹	N/A ²	■	■
Private and protected entries	N/A ¹	■	■	N/A ¹	N/A ¹	N/A ¹	■	■
Shared individual calendars	N/A ¹	■	■	N/A ¹	N/A ¹	N/A ¹	■	□
Finds group meeting times	N/A ¹	■	■	N/A ¹	N/A ¹	N/A ¹	■	■
Sends meeting requests	N/A ¹	■	■	N/A ¹	N/A ¹	N/A ¹	■	■
Database synchronization	N/A ¹	□	■	N/A ¹	N/A ¹	N/A ¹	■	□

N/A¹—Not applicable. The product does not have this feature. N/A²—Not applicable. The product does offer this function, but not in a networking module.

tion to a 5000-, 7000-, 8000-, or 9000-series Wizard.

Merlin's four contact-maintenance lists are strong on free-form data, but weak on specific contact fields. One list (Business Cards) has eight 28-character predefined fields, four user-definable free fields, and a free-form memo field. Each of the three Telephone Book lists offers three predefined name, number, and address fields and four user-definable

fields, as well as a memo field for each entry. In all lists, names are entered by keyboard, with no field-duplication keys or other automation. Merlin searches databases by text string only, looking through all the fields in every record on the list.

There is no automated phone dialing and no log of phone calls or contacts. Importing and exporting is simple, provided you remember that from a Wizard palmtop,

data is appended to the Merlin destination file, but exporting to a Wizard overwrites the destination file.

Merlin's calendar and scheduling features are almost competitive with those of other low-cost PIMs. Graphical daily, weekly, and monthly calendar views support scheduling—including reminder alarms—from any view by letting you click on the appropriate day. Conflicts are allowed but flagged in red. Auto-scheduling of recurring meetings is simple and versatile.

Merlin has some appeal for the scratch-paper scribbler. A topic outliner organizes thoughts, and any number of

SUITABILITY TO TASK		
Merlin, Version 1.0		
	POWER	EASE
Contact management	Fair	Fair
Calendar and scheduling	Fair	Good
Task management	Poor	Fair
Information management	Poor	Fair

ENDS

Odyssey Computing Inc.

On Schedule for Windows

BY HILLARY RETTIG

While most PIMs go to great lengths to hide the data structure under their interface, Odyssey Computing's On Schedule for Windows, Version 1.0b (\$99.95), flaunts it. The program is organized around a series of spreadsheets that house your contact records, calendar, to-do items, and call-history data. It's a simple scheme that turns out to be surprisingly powerful.

The power resides in On Schedule's customizability. Although the program ships with prebuilt spreadsheets, it also lets you design and build your own to record precisely the data you need. It also offers many of the same row-, column-, and cell-formatting options found in standalone spreadsheet programs, so you can view your data to the best advantage. The result: a highly personalized PIM requiring a minimal amount of effort. You can define and save custom views of your data; a "follow-up" view displays, for example, just the data you need to make follow-up calls to your top ten sales prospects.

On Schedule is more than just a pretty interface. Its contact management input

FACT FILE

On Schedule for Windows, Version 1.0b

Odyssey Computing Inc., 5962 La Place Ct., #215, Carlsbad, CA 92008; 800-446-3977, 619-929-7828; fax, 619-929-1012

List price: \$99.95.

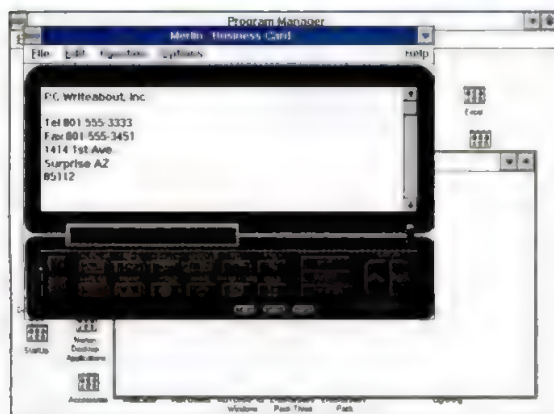
Requires: 2MB RAM (4MB recommended), 3.5MB hard disk space, Microsoft Windows 3.1 or later

In short: On Schedule for Windows is a powerful new PIM

that organizes your data using a spreadsheet format. It offers superb customizability and some powerful calendar and reporting features, but the program is slow and there are some gaps in its feature set. If you can live within its constraints, however, it's worth a look. On Schedule may be only a version or two away from giving the top competitors a run for their money.

ON READER SERVICE CARD

Merlin	On Schedule for Windows	PackRat	Sharkware	Time Planner Deluxe	WinPro
☐	☒	☒	☐	☒	☐
☒	☒	☒	☒	☒	☐
☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒
☐	☐	☐	☒	☒	☐
N/A①	N/A①	N/A①	☒	☒	N/A①
N/A①	N/A①	N/A①	Yearly	None	N/A①
☐	☒	☒	☐	☒	☐
N/A①	☒	☒	N/A①	☐	N/A①
N/A①	☐	☒	N/A①	☒	N/A①
Unlimited	Unlimited	Unlimited	Unlimited	3,000	Unlimited
32,000	Unlimited	32,000	2,000	32,000	5,000
☒	☒	☒	☒	☒	☒
☐	☒	☒	☐	☐	☒
☐	☒	☐	☒	☒	☒
☐	☒	☒	☐	☒	☐
☐	☒	☒	☐	☐	☐
N/A①	Unlimited	Unlimited	N/A①	N/A①	N/A①
☐	☐	☒	☐	☒	☐
☐	☐	☐	☐	☐	☐
N/A①	N/A②	N/A②	N/A①	N/A①	N/A②
N/A①	N/A②	N/A②	N/A①	N/A①	N/A②
N/A①	N/A①	N/A①	N/A①	N/A①	N/A①
N/A①	N/A①	N/A①	N/A①	N/A①	N/A①
N/A①	N/A①	N/A①	N/A①	N/A①	N/A①
N/A①	N/A①	N/A①	N/A①	N/A①	N/A①



Merlin's uncluttered command board looks just like the one found with Sharp's Wizard.

free-form memos can be created by themselves or attached to a contact. Here, too, searches are simple text-find operations, with no Boolean operators, indexing, or keywords. There is no support for fonts, DDE, or OLE.

Those seeking full-fledged features and automated versatility needn't look to Merlin. Even so, with or without a Wizard, Merlin is easy to learn, providing a place for basic contact data and profuse, loosely structured notes.

screen records a generous amount of information about your contacts and offers user-definable fields for text and data types such as date and currency. Note taking, dialing, and other activities are easy, and you can sort your database simply by double-clicking on the appropriate spreadsheet column. You cannot perform multiple column sorts, however.

The program's calendar module is similarly robust. Its views are well designed, and the month view in particular offers useful details about your appointments. You can schedule appointments directly from any calendar view and keep several of these views open at once.

On Schedule offers many other features, including integrated word processing and document management systems. In the latter, you can add files to a customizable spreadsheet-type view—which can be sorted like other views—and launch applications, linking them to contacts and other records. The Reports facility is particularly strong, offering not just user-definable field merges and formatting but also an easy-to-use screen-painter design facility. There are only a few predefined label and address book formats.

On Schedule falters on some of the details. Perhaps most serious is its sluggishness; on a 386DX/33-based PC, it had limited usefulness for real-time tasks such as note taking during telephone calls. Also, integration among On Schedule's modules

is poor: You can't schedule to-do tasks and dial directly from the contact screen, and you can't consolidate appointments, to-do tasks, and reminders into one display.

The program has a few more rough edges, presumably to be ironed out in

future versions. It doesn't offer Boolean searches, and its recurring-events and contact-history features are weak. Its manual and on-line help are skimpy and occasionally misleading. Moreover, the package

has no workgroup or network features; both types of features are expected to be added later this year.

Nevertheless, On Schedule succeeds—mostly—at the difficult task of offering most of the benefits of structured and nonstructured PIMs. It may be only a version or two away from giving the top competitors a run for their money.

Polaris Software Inc.

PackRat

BY HILLARY RETTIG

Until July 1993, PackRat was the widely acknowledged leader among high-end PIMs in terms of features and market share. Then Polaris Software released Version 5.0, a redesign incorporating object-oriented technology. Unfortunately, Version 5.0 suffered from several serious problems, including missing features, slowness, bugginess, and—worst of all—instability. Polaris has since produced several maintenance releases, but none of them have fully addressed the problems that plagued Version 5.0.

Version 5.011 (\$395) represents some progress but unfortunately not enough. Whereas Version 4.1 was networkable, Version 5.011 is not. And PackRat continues to have stability problems. It caused general protection faults on our test system (a 386/33 with a stacked hard

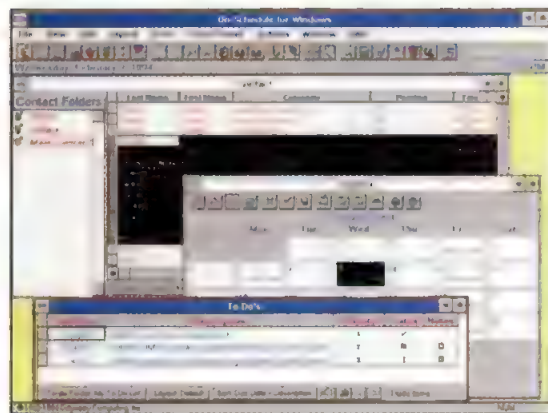
disk) that Polaris was unable to correct. Moreover, many features behaved nonintuitively or erratically.

For example, we found strange file behavior (PackRat added empty records to our test database, for example) and some partially obscured text. Also, double-clicking on the month view often invoked multiple, redundant day views.

All of this is a shame, because the program is brilliantly conceived. PackRat uses a file-folder metaphor, but it is object orientation that distinguishes this program, placing it in its own, hybrid PIM/Windows Shell category. PackRat lets you create as many folders as you need, and you can use them to hold one or more "objects" from a list of nearly 30.

These objects include several calendar views; a list view that can be customized into a phone book; miscellaneous tools, such as charts and bitmap viewers; and iconic tools for running applications, printing, and faxing. Users can easily add, delete, and modify objects; cut, copy, and paste them among folders (using menus or the drag-and-drop feature); and change both their data and display characteristics. Additionally, PackRat lets users edit existing tools or build their own from elements that include lists, macros, and action buttons.

The spreadsheetlike list viewers can



On Schedule organizes your information in a series of customizable spreadsheets.

FACT FILE

PackRat, Version 5.011

Polaris Software Inc., 15175 Innovation Dr., San Diego, CA 92128-3401; 800-722-5728, 619-592-7400; fax, 619-592-7430



List price: \$395

Requires: 2MB RAM, 8MB hard disk space, Microsoft Windows 3.1 or later

In short: Version 5.011 represents some progress but unfortunately doesn't address all of

Version 5.0's tragic flaws. Though powerful and highly customizable, this latest incarnation lacks stability and exhibits erratic behavior. It remains a competitive program with respect to its improved feature set, but its hefty price tag and slow program speed make PackRat a decidedly risky investment. Proceed with caution.

ON READER SERVICE CARD

• A Parade of PIMs: *New in '94*

By Kathy Yakal

Software developers continue to search for that perfect combination of features that will persuade you to give up your rotary cards, desk calendar, and legal pads. Some vendors are even more ambitious, offering information management tools with tendrils reaching into every corner of your PC. Here's a look at some new products released too late for review here, as well as some promising beta releases of upgrades.

ANYTIME FOR WINDOWS

AnyTime for Windows, Version 2.0, from Individual Software (800-822-3522), is a simple organizer best suited to people who need basic address-database, schedule, and to-do-list tracking. With this \$49.95 product, you can group contacts into user-definable categories and add notes to their records. Your database, or a portion thereof, can be printed using templates for popular paper-organizer, mailing-label, and rotary-card formats.

You can also group appointments into categories. You can prioritize and roll over to-do-list items, and view and print your calendar in various layouts and formats. Although AnyTime lacks the high-end information management features provided by other PIMs in our

roundup (such as word processing and fax links, random-data management via folders and outlines, automated contact histories, and Boolean searches), it's a capable organizer with an attractive, understandable interface.

CROSSTIES FOR WINDOWS

CrossTies for Windows, Version 1.0 (\$149.95), does far more than a typical PIM. This new title from CrossTies Software Corp. (800-955-8437) organizes your address book and schedule and also gives you sophisticated organizational tools. You define an object, such as a Project, and then link related objects to it (such as people, activities, e-mail, faxes, programs, documents, spreadsheets, and drawings), no matter where they are in your system. You can launch applications associated with files from CrossTies, or open the files themselves without launching the program.

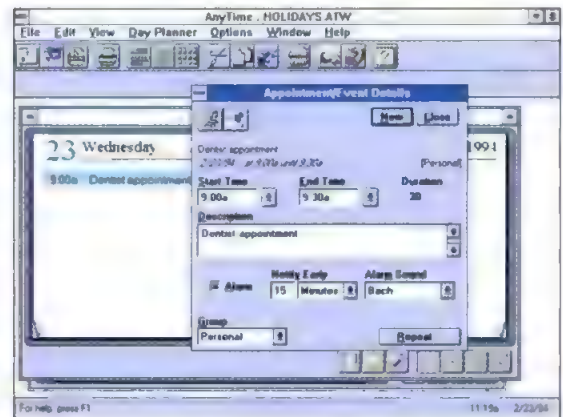
ECCO PROFESSIONAL

ECCO Professional, Version 2.0 (price not yet determined), is expected to

build on the already impressive power of Version 1.1, reviewed here. This Arabesque Software (800-457-4243) offering will have several new capabilities. These include workgroup features, which will allow group scheduling; shared calendars, phone books, and outlines; upgraded file access; and security controls. Furthermore, new file-synchronization capabilities will let you update a remote computer and redi-

rect your mail.

In addition, ECCO is expected to integrate directly with Delrina Corp.'s WinFax PRO. And to better utilize ECCO's OLE and Shooter features, Version 2.0 will include a comprehensive DDE API, facilitating better information sharing with other Win-



With AnyTime for Windows, you can keep track of basic address book information and schedules.

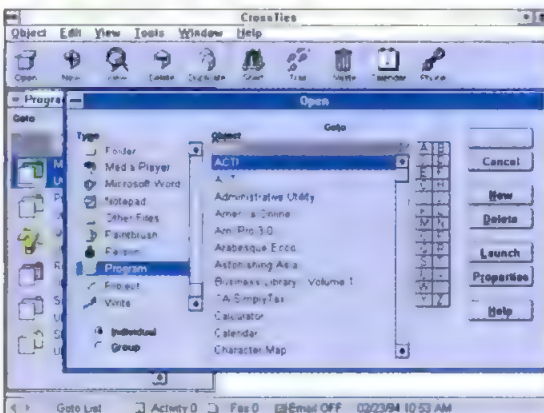
dows programs that support DDE.

INFOCENTRAL

WordPerfect Corp. (801-225-5000) has announced a new title as a part of its new Main Street consumer-product line. Like the best of today's PIMs, InfoCentral, Version 1.0 (\$149), is expected to serve as more than a self-contained application by reaching out to data in other Windows programs (such as spreadsheet and word processing programs) and linking that information back to related contacts and organizations. InfoCentral implements object-oriented technology, which offers more flexibility in dragging, dropping, shifting, and manipulating information.

Scheduling, address book, and to-do-list features are joined by some more-sophisticated attributes, such as iBases (information bases). Four iBases will ship with the product: those

Continues on page 252



CrossTies for Windows offers tools for managing virtually everything in your PC.

Personal Information Managers

Parade of PIMS

CONTINUED FROM PAGE 251

comprising lists of consumer-product companies, computer hardware and software companies, and wines of the world; another iBase offers information concerning world business travel. More iBases are planned.

BRIDGING THE GAP

The distinction between contact managers and PIMs is not always clear. We look at two contact managers in the sidebar "Contact Managers as PIMs." Both ACT! and GoldMine have new releases underway.

ACT! FOR WINDOWS

Symantec Corp. (408-253-9600) will bring an important new dimension to its contact manager. ACT! for Windows, Version 2.0, will include an important tool missing from the first version: network support. Integrated e-mail, as well as enhanced address book and calendar printing, improved importing, and broadcast faxing, will also be incorporated in the \$279.95 product.

GOLDMINE FOR WINDOWS

The premiere version of GoldMine for Windows (\$295) is expected to include a feature important to the management of personal information. The product, from Elan Software Corp. (310-454-6800), will provide a Link feature—powered by DDE and OLE—for linking data files to contacts in your GoldMine database. For example, you could link a fax or a graphic to an individual's record, and access it quickly by double-clicking on it.

GoldMine for Windows can handle sophisticated scheduling and to-do-list tracking, and it lets you store random and linked notes, as well as an unlimited number of details about a contact. □

record a contact's address and telephone number, billing status, an identification number of some sort (a Social Security number, for example), and other information. The list viewers offer Boolean searches across multiple fields—including attachments—and sorting using up to four keys.

In the calendar, you can use filters to create multiple views. You can customize the day view to display any part of your day, for up to seven days. There's also a Gantt chart—a graphical time line that helps you keep track of your schedule. The Reminder scheduler lacks graphical time entry and defaults to the present time. And the Recurring-Events scheduler doesn't let you schedule multiple days (every Monday and Wednesday, for example) or offer exclusions.

PackRat has a to-do-list feature, although it lacks automatic rescheduling. The free-form note-taking feature lacks rich text formatting, categories, indexing, and time-and-date stamps—though it does have a spell-checker and a thesaurus.

PackRat's report printer lets you construct reports from 25 "report objects." Reports can include both data objects from the main program and graphical elements such as ellipses and lines. The report printer works well for designing forms, but it is somewhat awkward at handling complex combinations of text and field information. PackRat comes with several predesigned report templates, but

it lacks support for some important third-party templates, such as DayTimer and Avery-label formats.

PackRat offers both a comprehensive macro language (PackRatBASIC) and the ability to create scripted macros using a built-in recorder. The program comes with macros that interoperate with popular Windows word processors.

Because PackRat's objects are well designed—and because you can use them in any combination—it's possible

to build the PIM of your dreams using PackRat. There's more to come (the network version is expected to be released in mid-1994), but until Polaris succeeds in smoothing out of the program, you should proceed with caution.

CogniTech Corp.

Sharkware

BY STEVE GILLILAND

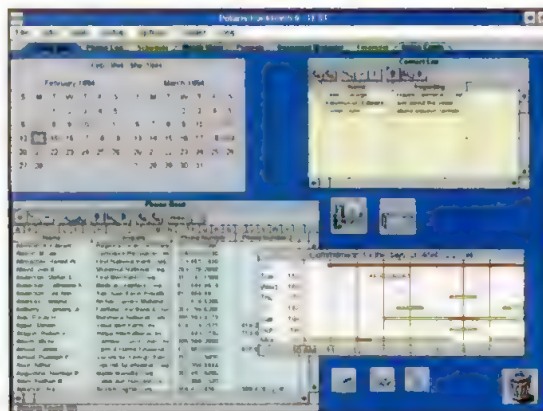
The name conjures up thoughts of ruthlessness and fear, but Sharkware, Version 1.0, is in fact more friendly than frightening. CogniTech Corp.'s \$189.95 offering is easy to learn, reasonably quick, and strong on contact management, with free-form notes and an unlimited number of user-definable, auto-indexed fields for each contact. While it's not as didactic as Franklin Quest Co.'s Ascend, Sharkware does include a template that proffers advice on managing contacts and finding a new job, as well as a (potentially annoying) pop-up that provides inspirational quotes from businessman and promoter Harvey Mackay. The pop up—fortunately—can be turned off.

At first blush, Sharkware's screen is a bit overwhelming, with icons, buttons, and pull-down menus placed in seeming disregard for order. But an hour with the printed tutorial and a bit of experience reveals the underlying harmony of Sharkware. One-line descriptions of each screen element, shown as the mouse moves

SUITABILITY TO TASK

PackRat, Version 5.011

	POWER	EASE
Contact management	Excellent	Good
Calendar and scheduling	Good	Fair
Task management	Fair	Good
Information management	Good	Fair



PackRat lets you construct your own PIM from folders and PIM objects, including list viewers and application icons.

**HOW MUCH
CAN ONE MAIL
SYSTEM DO?**

Can a mail system let you and everyone else in your office do more? Can it save you time, money and headaches? Can it keep you

ing in. And send faxes right from your word processor. Whether you're in Microsoft Word, Microsoft Excel, Lotus' 1-2-3® or WordPerfect®

learning to send and receive mail easy. And if you're going to be away, Mail's Out of Office feature will automatically forward a message to everyone who tries to get in contact with you while you're out.

You can save even more time

by adding other features that are just as easy to use as Mail. Like Schedule+, the best-selling scheduler for Windows. It helps you manage your calendar and reminds you of meetings and deadlines.

With Schedule+ you'll spend less time rounding people up for meetings, because Schedule+ lets you see when the people you need are free. So you can pick a time that's convenient for everyone.

YOU DECIDE.

connected whether you're down the hall, or down under on an important business trip?

Microsoft® Mail can. No wonder it's the best-selling LAN-based mail product in the world.

But first things first. How will Microsoft Mail work with what you already have? Perfectly. Whether you're in MS-DOS®, the Windows™ operating system, on a Mac® or OS/2®. And you can send mail without exiting the application you're work-

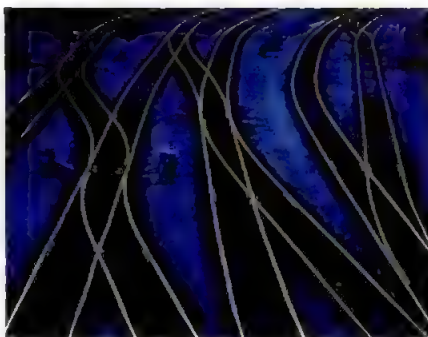


With Mail Remote, you don't need to be in your office to keep in touch. And with wireless, you don't even need to be near a phone. You can log in anywhere, anytime.

How can Microsoft Mail save you time? Mail has smart, sensible symbols and on-line help that make

It even shows you when everyone else is free. So you can schedule meetings without a lot of legwork.

Want to cut down on paperwork? Use Microsoft electronic forms to speed expense reports, vacation requests and any other routine forms through your office at the speed of light. And you can track them easily. So you won't have to worry that an important request has disappeared into a black hole.



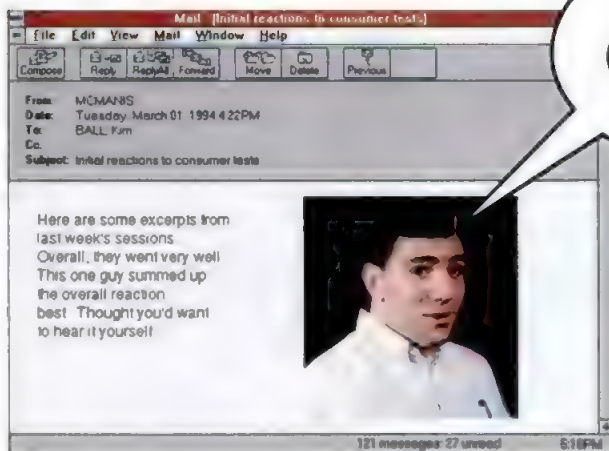
you do in your office. It can even save you money. Just read the important messages, then let Mail Remote respond automatically when rates are lowest.

No other mail system is easier to use. Or gives you so many different ways to stay in control of your work. To prove it, we'll send you a free demo disk. Once you've seen everything you can do, we think deciding on a mail system will be easy. Just call (800) 871-3271.

Microsoft Mail is the best-selling LAN-based mail product in the world. Add Schedule+ for a personal time-management and group scheduling system. And electronic forms to speed paperwork through your office. Take them all on the road with Mail Remote. Together they'll make your whole organization more productive than you ever could have imagined.

Electronic forms coordinate the flow of important forms through your office. Making sure everything gets where it's going. Without getting lost. Right on schedule.

Finally, with Mail Remote you can avoid disasters by staying connected while you're on the road, because Mail Remote lets you work just like



COOL.

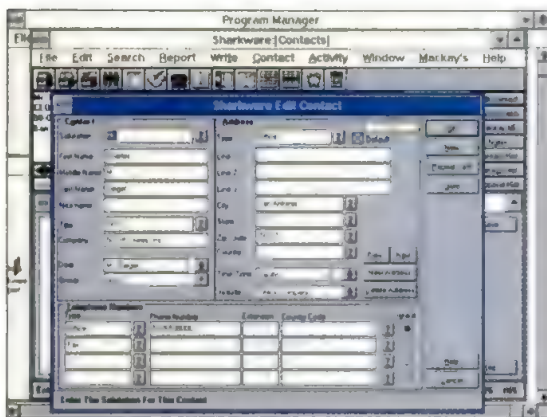
Microsoft Mail gives you an infinite number of ways to be more persuasive. Send words, graphs, pictures and sound as mail messages. There's almost no limit to what you can send.

Schedule+'s alarm clock reminds you of meetings, deadlines, anything. So you'll stay organized and save time. Without it, we might have forgotten this caption entirely.



Microsoft

Personal Information Managers



Until you learn Sharkware, the main and contact editing screens seem like testing grounds for chaos theory.

over them, help remind you what it's all about. Sharkware's speed can seem labored on a 386 with 4MB of RAM—especially if you've made heavy use of multiple search criteria—but speed is more than acceptable with 8MB.

Unlimited user-definable fields and quick, intuitive importing of ASCII, CSV, and .DBF files are the highlights of the program's contact management abilities. Manual entry of new contacts is facilitated by an option for duplicating the last record entered. All fields are automatically indexed, and searches can include an unlimited number of criteria linked by AND or OR. Reports based on search results are

easily constructed prior to the search. Sharkware lets a user conduct a quick one-field search at any time for instant contact location.

Three user-named history files are automatically time-and-date stamped when an activity concludes. You add unstructured notes or choose from an unlimited number of user-defined standard responses to do such things as follow up a call or set up a sales meeting. There is no laptop-to-desktop database reconciliation, but you can save import definitions for reuse.

Sharkware has a number of personal scheduling features, including daily and weekly views of phone calls to be made, appointments, and to-do lists. Items from any list are easily entered, assigned a priority, associated with contacts, scheduled as recurring, or dragged and dropped into other lists.

Unlimited contacts, contact fields, and contact note fields are designed to ensure that every piece of data has a place. You can create any number of databases to hold contacts. In addition, each database can be subdivided into as many groups as you need (one might comprise only doctors, for instance). Yet Sharkware has some omissions, including a global-search feature and DDE and OLE support for graphical items. It could also benefit from expanded support of outside word processors used for correspondence (now limited to Ami Pro and Microsoft Word for Windows).

Sharkware offers a nice combination of power and ease of use—assuming that contact management is your principal aim and you don't use a network or require group scheduling. The program lacks the untrammelled spirit of Instant Recall for Windows, but its structure is loose enough to allow room for imagination.

SUITABILITY TO TASK

Sharkware, Version 1.0

	POWER	EASE
Contact management	Good	Good
Calendar and scheduling	Good	Good
Task management	Fair	Good
Information management	Fair	Fair

H.M. Hinsch & Co. Inc.

Time Planner Deluxe

BY STEVE GILLILAND

For the most part, personal information managers are about as personal as high tea: formal and starched. Using H.M. Hinsch & Co.'s Time Planner Deluxe, Version 2.0—which sells for \$59 until June 30, 1994, and \$129 thereafter—is more like drinking a beer on the back porch: relaxed and informal enough to let you be yourself. You can jot down a note and toss it in a folder, or get serious and begin planning that addition to the house.

Time Planner Deluxe's screen is a bit confusing, but only until you realize that its "notes" mean something different than what you're probably used to. The premise is simple: Time Planner Deluxe puts important information (about, for example, projects or your staff) in notes.

These notes, which are gathered into folders, serve as the foundation of Time Planner Deluxe. Each client or project, as well as employees or teams of employees, can have a folder. Then Time Planner Deluxe takes over, working almost like a project manager to organize appointments, projects, and high-priority tasks and display

FACT FILE

Time Planner Deluxe, Version 2.0

H.M. Hinsch & Co. Inc., 347 Clinton St., Brooklyn, NY 11231; 800-952-3530, 718-237-1977; fax, 718-237-1990

List price: \$59 until June 30, \$129 thereafter.

Requires: 4MB RAM, 2MB hard disk space, Microsoft Windows 3.1 or later

In short: Time Planner Deluxe is a new idea in time management.

It turns your random information into findable and workable data, and at the same time provides excellent scheduling and simplified project management. While Time Planner is fast and easy to learn, it lacks definable contact management fields and doesn't support OLE or DDE. Even so, it's an excellent tool for coordinating your time, duties, ideas, and creativity.

ON READER SERVICE CARD

Sharkware, Version 1.0

CogniTech Corp., 500 Sugar Mill Rd., #240-A, Atlanta, GA 30350; 800-947-5075, 404-518-4577; fax, 404-518-4588

List price: \$189.95

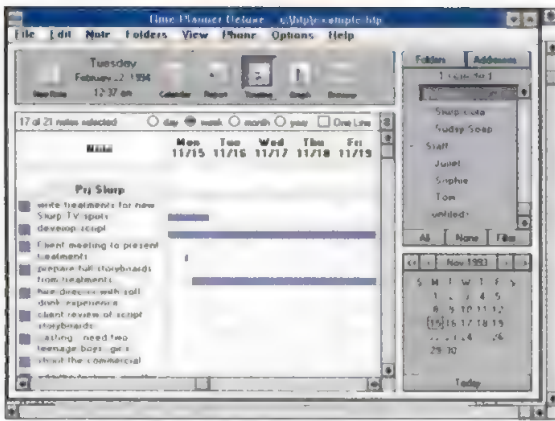
Requires: 4MB RAM, 7MB hard disk space, Microsoft Windows 3.1 or later

In short: Designed mainly for contact management, Sharkware offers an unlimited number of

user-defined fields and free-form notes. There is no network support, and it can't do group scheduling. It handles appointments and scheduling well, however, providing daily and weekly views and drag-and-drop moving of items. If contact management is your principal aim and you don't use a network or require group scheduling, Sharkware might be the PIM for you.

ON READER SERVICE CARD

Personal Information Managers



It's not quite a Gantt chart, but the time line screen in Time Planner Deluxe is an excellent way to see the big picture.

them in a number of different views (on-screen activity report, time line, or graph).

Time Planner Deluxe handles contact management with its Addresses database. Each record includes approximately 35 fields. Whether imported or created individually, these contacts initially reside in the Addresses folder. Each can be turned into a folder of its own, however, to which you can attach notes.

Using the contact folder along with the subfolders and templates Time Planner Deluxe provides, you can auto-dial or receive a call from a contact, using a Note template (Outbound, Inbound, or Call Follow-Up) to time and record information about the call. The resulting note

SUITABILITY TO TASK

Time Planner Deluxe, Version 2.0

	POWER	EASE
Contact management	Good	Fair
Calendar and scheduling	Good	Good
Task management	Good	Fair
Information management	Excellent	Good

ends up assigned to the contact's folder. If a contact folder doesn't exist, the note winds up in a specific subfolder.

Time Planner Deluxe is efficient at finding notes, because you can set up a filter with almost 20 different elements. For instance, you could look for notes containing the name *Bob* that were created before Christmas and at the same time omit from the search any undated notes on unfinished tasks with a high (red) priority.

You can turn any note into a task note; just assign a start time, an end time, and a priority level. Assigning a duration to these task notes creates a scheduled event that will appear on the time line view of a folder. A note can also have a total task duration and an hourly rate. You can schedule notes in "work time," making allowances for weekends and holidays and figuring in workday length, which is user-definable. Moreover, you can schedule from a more conventional calendar view by dragging through the time duration to indicate appointment length and then assigning an existing or new note task.

The time line view is similar to a Gantt chart. At the left side of the screen is a notation denoting a task note in one of five colors, which indicate priority. The note spans the hours, days, or weeks of the task duration. You can reschedule a task by dragging the time bar, or schedule a new task directly in time line view by dragging a time bar for the appropriate duration.

Time Planner Deluxe handles information in the same way that you probably do: with paper, empty folders, and a filing cabinet. Record the information on paper, put it in an existing folder (or create a new one), and slip the folder into the cabinet. You can cross-reference the notes in the folders, and you can create a color graphic showing a note's schedule date and duration, as well as its importance.

Time Planner Deluxe is decidedly fast and easy to learn. It lacks, however, definable contact management fields, and it doesn't support OLE or DDE. Even so, if you need a tool to coordinate your time, duties, ideas, and creativity, this program may very well be just the PIM for you.

WinWare Inc.

Winfo Pro

BY KATHY YAKAL

WinWare's Winfo Pro, Version 2.0 (\$49.95), offers a set of basic no-frills tools for contact and schedule management. It lacks an internal word processor but can handle mail-merge and faxing via DDE support and a link to Delrina Corp.'s

WinFax PRO. Its most outstanding characteristic is its customizable interface, unusual in a low-cost PIM.

Winfo Pro's main working screen displays a view of the active database in list format. You can edit the default view and specify the fields you want displayed. You click on a list item to pull up the complete record, and you can easily alter the way each view of a record looks, both on-screen and in print. You can edit existing designs (layout, field names, and structure) and create new ones.

Winfo Pro imports only ASCII files. Its mapping function looks at your file and pulls out each field whose name it doesn't recognize, letting you select an existing Winfo Pro field that matches it. The import process is speedy. During testing, it took us less than a minute to import 1,000 records using a 486DX2-based PC. To enter data manually, you fill in the blanks, copying a record if you're adding records that share several fields. There are eight predefined record formats; each displays a subset of the data for one contact.

Winfo Pro lacks typical contact management features such as call- and history-logging, and it doesn't attach to-do items and appointments to records, but its task management features are quite adequate for simple scheduling. You type data into the fields via dialog boxes, and your tasks appear on the calendar or to-

FACT FILE

Winfo Pro, Version 2.0

WinWare Inc., 4665 Lower Roswell Rd., #9,
Marietta, GA 30068; 800-336-5985
404-612-0806; fax, 404-993-2351

List price: \$49.95.

Requires: 2MB RAM, 2MB hard disk space, Microsoft Windows 3.1 or later

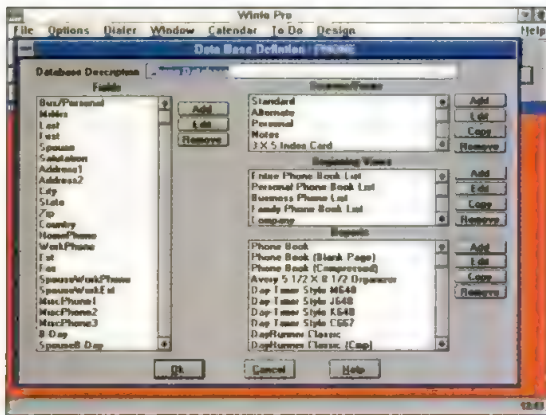
In short: Winfo Pro offers eight different templates for viewing your records, which you can eas-

ily customize. You can also easily view your databases (or selected portions thereof) and enter data. But Winfo Pro falls behind its peers in areas such as extensibility, document processing, random-information management, logging, and security. Winfo Pro's main strength is its high level of database and record customizability.

457 ON READER SERVICE CARD

SOFTWARE

Personal Information Managers



Winfo Pro's many record designs can be edited or completely redesigned.

do list. To-do items can be prioritized and carried over until completed, and schedules can be displayed in a variety of formats (daily, weekly, and so on). You can print your schedules using templates for DayTimer and Day Runner, and a variety of label, envelope, and rotary-card formats.

The program's search capabilities are impressive, to a point. You can conduct

simple and Boolean searches, and run global searches. You can print search results as reports or phone books, or use the program's DDE or WinFax PRO links to send a group communiqué, but you can't save the groups you've defined. You can, however, use the Winfo Pro phone book as your WinFax PRO phone book.

Winfo Pro provides no password security, and although you can share databases across networks, the manual contains no instructions on the subject and specifies no networks. Documentation is meager, and on-line help is skimpy. And WinWare recommends that user-built databases not exceed 5,000 records.

In addition, you can link two databases, but the second is limited to read-only access. Database reconciliation is confined to backup/restore commands, which warn you only if you're about to overwrite a database with an older version.

SUITABILITY TO TASK		
Winfo Pro, Version 2.0		
	POWER	EASE
Contact management	Fair	Good
Calendar and scheduling	Fair	Good
Task management	Fair	Fair
Information management	Fair	Fair

Winfo Pro has limited abilities in the area of random-information management. Every record has a notes screen attached to it, and you can search for any text within. You can't set up any free-standing notes, however.

Winfo Pro gets average grades for scheduling and task management, and it's missing some functions that are found in the best PIMs. Yet its level of database and record customizability is impressive and represents its real forte, especially given its price tag. If your primary requirement is flexible record design, Winfo Pro deserves a look. For power in information management, however, there are better choices. □



Yes! That's
62% off on
every issue!!!

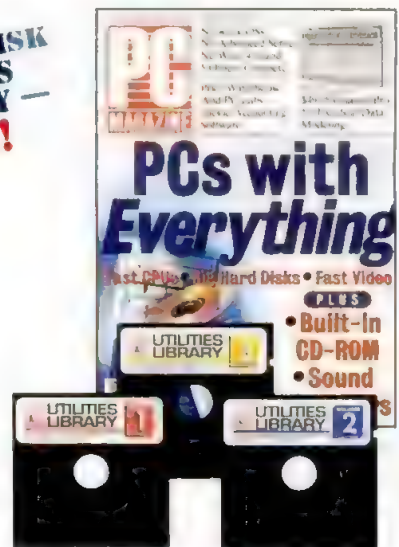
BONUS: 3-DISK
UTILITIES
LIBRARY —
FREE!

Call now to get PC Magazine
delivered to your door for up to
62% less than you'd pay at the
newsstand.

Act fast...
and get software FREE!

Call now and you'll get our new-subscriber
bonus — 3-disks packed with 146 all-star
utilities for DOS, Windows™ and Laptops —
FREE with your paid order!!!

- 1 YEAR of PC MAGAZINE (22 issues) for only \$29.97 — 54% off the \$64.90 cover price!
- SAVE MORE! 2 YEARS (44 issues) for only \$49.97 — that's 62% off!



CALL
1-800-289-0429

To insure savings and bonus, be
sure to mention this code when
you call: 4294

Network Edition

THE LATEST NETWORK PRODUCTS AND MANAGEMENT TECHNIQUES

Phoning Home: Linking Remote Offices to the Central LAN

That remote office of yours is no longer so small. Now who has the right remote-office router for the job?

By Stan Schatt

It's late. You need to update the database at central headquarters, 3,000 miles away, by morning. You watch your modem's LEDs blink as it redials, you wait and hope for a successful connection, and you wonder: Isn't there a less stressful way to do this?

Well, you're not alone. In fact, the demand for remote-access products that are easy to use has created one of the fastest-growing segments of the networking industry. Dozens of vendors are leaping in with all sorts of management and communications software, wiring hubs, and routers that make tying remote offices into the central network a lot simpler than ever.

In the past 12 months alone, we have witnessed an avalanche of a new kind of router, for example, routers that are

specifically aimed at the remote-office market. These routers are far easier to use than the previously available types of routers. Router heavyweights Cisco, Proteon, and 3Com all released products—the 2500, the BOSS, and the NETBuilder Remote Control with Boundary Routing, respectively—that were aimed squarely at the remote office. Wellfleet Communications, the last of the

router leaders to enter this market, is planning to ship its own remote-office router, the Access Node (AN), by the time this issue goes to press. Now instead of fussing with modems and communications software you can easily zip off that report in seconds: Just send it over a remote link into the home office.

Low-end routers aren't new. Small offices have long benefited from small, inexpensive routers from vendors such as Telebit and Shiva. However, these products lack the management facilities and often the protocol support available from the Cisco, Proteon, and 3Com remote-office routers.

And installing these routers has often been tricky, requiring users to be intimately familiar with arcane commands. Many of the new routers promise instant

▶ NETWORK EDITION INDEX

First Looks

ZDS Z-Stor.....	NE13
Syn Optics Lattis System 5000.....	NE13
Nokia PC Card.....	NE22
Farallon Timbuktu for Windows.....	NE26
Simware REXXware.....	NE28
Cayman GatorStar iHR.....	NE32

New & Improved

Meeting Maker XP.....	NE35
Cisco 7010.....	NE35
Catalyst.....	NE35
Synchronize.....	NE35
SwitchBalance.....	NE36
EtherChannel.....	NE36
StarWorks.....	NE36
Saber Enterprise Application Manager.....	NE36

Intellect.....	NE38
HP AdvanceStack.....	NE38
Opti-UPS.....	NE38
Lippis on Networking The Internet: Today's Information Highway?.....	NE41
Dorfler & Greenfield Riding a Development Wave.....	NE43

You don't have to bl
to have a client/



How up your network server database.

You want a proven high-performance database, but you're less than thrilled at the idea of having to level and re-create your whole system. No problem.

Because the people at Oracle, the world leader in databases, and Novell, makers of the leading network operating system, have teamed up to

design a powerful solution.

It's called OracleWare™.

OracleWare includes

NetWare® 3.12 or UnixWare™ 1.1, Oracle7™, Oracle Glue® and Oracle Office™ all in one convenient, easily installed package.

OracleWare runs hundreds of existing business-critical applications. It lets you leverage your current investment and familiarity with NetWare.

And because OracleWare is an integrated product, you'll get the advantages of a single installation. Not to mention a single

phone number to call for help when you need it.

Just call 1-800-633-0643

ext. 4452 for a free CD-ROM

or printed catalog of

OracleWare applications

and the location of your nearest authorized OracleWare reseller.

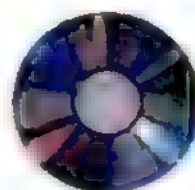
Find out how easy it is to

have the power of a proven

database while keeping your

network all in one piece, instead

of blowing it up.



Call for
CD or printed
catalog.

ORACLE® <---> NOVELL.

OracleWare

connectivity: Just take them out of the box, turn them on, and connect them to the office network.

For both you and your MIS director this means good news. You can turn off those modems (at least while you're sending data from Chicago into the Boston headquarters) and capitalize on the simplicity and speed of using the LAN. Your MIS director in turn can relax, not having to field those late-night phone calls from you when you're having difficulty connecting to the LAN.

WHAT THEY TACKLE

In selecting the router that will hook your remote office to the central office, probably the most important criterion is what kind of router is running in the central office. Cisco, Proteon, and 3Com require that you use their higher-end routers in the central office to get the full benefit of their remote products. Wellfleet's Access Node is also expected to require the Wellfleet central router to function most fully. Once the central router identifies the remote router, the remote router can download configuration information from the router or a server rather than requesting it from the user.

These solutions also need to be easy to install because the personnel found in remote locations often lack the technical expertise found at central headquarters. For this reason, remote-network functions, usually incorporating SNMP, are essential. A bank with hundreds of branch offices cannot afford to lose time waiting for a network technician or manager to reconfigure equipment on-site. An SNMP-based network management program enables network administrators to perform these routine tasks from a console located at central headquarters.

Cost is critical because the same basic router configuration might have to be duplicated hundreds of times. A few

hundred dollars difference in the price of one unit is significant across a large network.

The type of wide area network links supported is also critical. Support for

Router Recommendations

With so many options available, which router do you choose?

Remote-office requirement	Recommendation	Reason
Router providing a link to central headquarters where backbone routers are found	Branch-office router from the same vendor providing backbone routers (such as Cisco, Proteon 3Com, or Wellfleet)	One vendor to call, no interoperability problems
Router providing a link to central headquarters where intelligent hubs are found	Branch office hub/router from the same vendor providing hubs (such as Cabletron, Proteon, or SynOptics)	One vendor to call, no interoperability problems
Moderately priced router for staff with little internetworking expertise	3Com Boundary Router	Easy installation and remote manageability
Multiprotocol router for staff with little internetworking expertise	Cisco 2500 or Wellfleet Access Node	Full range of protocols, easy installation, and remote manageability

Integrated Services Digital Network (ISDN) might be irrelevant for a company with branches located in areas slow to implement this technology, while support for Switched 56 dial-up service might be critical for certain applications.

Fault tolerance should also be considered: Can cards be hot-swapped (replaced while the machine is operating)? Can the network traffic be redirected away from a defective adapter without bringing down the entire LAN?

Remember to think about flexibility. Most of these routers come in fixed configurations, typically one or two Ethernet

or Token-Ring ports and one or two WAN ports. How expandable is the remote-office equipment should the office begin to grow? What about security? Network managers spend many sleepless nights thinking about the ramifications of opening up their central network to outside callers.

And of course the range of supported protocols is very important. Don't forget: After years of benign neglect of their remote offices, MIS managers are finding that those offices often chose network solutions that differed widely from the LAN technology installed at central headquarters. Linking these remote offices to the central LAN often means routing several different protocols. The implementation of an enterprise network that closely links all remote offices for improved communications might mean having to grapple with a grab bag of protocols including TCP/IP (typically a Unix network), AppleTalk (Macintosh networks), IPX/SPX (NetWare LANs), and even synchronous or High-level Data Link Control (an IBM mainframe). Make sure that the router you are looking at supports the protocol your office uses.

Routers often use proprietary algorithms and thus are often incompatible with routers from other vendors; today,

Remote-Router Facts

Remote-office connections are more important than ever. In today's fast-moving economy, remote workers need faster, more complete access to resources on the corporate LAN.

Remote-office routers function the same way as the routers back at the central headquarters: They take packets of data on a network, determine which network the packet is bound for, and then direct the packet to the router port associated with that network or—as in the case of the remotest office—to the WAN port that connects with that network.

How many networks these products can connect varies with the type of router. Remote-office routers

usually connect one or two local networks to one or two remote networks. In contrast, central-office routers, which are typically used in regional offices, may connect anywhere from a few to over a dozen local or remote networks. Consequently, they come with far more powerful processors and architectures and support a much broader range of protocols and network interfaces.

The new remote-office routers are still small and economical, but they now employ much of the same routing software that has been provided in the high-end routers. This is most noticeable in the range of protocols they support.

ARNET Connect

DIRECT

The Right Connection or Your Money Back

Since 1983, Arnet has been the leader in serial connectivity by manufacturing, marketing and supporting PC connections around the world. The basis of our success..... **quality products backed by superior support.**



Arnet Certified and Supported
Arnet LABS have tested and approved each of the

connectivity products listed here and we guarantee product compatibility. Our pre-testing of these configurations affords you the perfect connection the first time - without the expense of trial and error networking.



30-Day Money Back Guarantee

To increase your level of confidence in our products and your purchase, we provide a 30-day money back guarantee. If you are not completely satisfied with the hardware product, we will gladly refund your purchase price plus sales tax.



Lifetime Warranty

Each of our Arnet products is covered by a full lifetime warranty. Should you encounter any defect, we will promptly replace your product at no additional charge.



FREE Technical Support

With a full staff of expert technical support representatives, Arnet provides the best in technical assistance for the lifetime of the product.

CIRCLE 903 ON READER SERVICE CARD



Rock Solid Connections from Digi International

Arnet Corporation
618 Grassmere Park Dr., #6 Nashville, TN 37211
(615) 834-8000, (615) 834-5399, FAX

BRIDGE/ROUTER

Retix 4760 Local Bridge Router w/BNC	2,834.
Retix 4760 Local Bridge Router w/AUI	2,834.
Retix 4941 Remote Bridge Router	4,455.

CSU/DSU & MODEMS



ClusterPort 32 w/(2) UDS MR56 CSU/DSU ...\$ 3,715

Connect remote users without expensive multiplexers

UDS DDS/MR56 (RS-232, V.35) CSU/DSU	585.
UDS SW5611 (Switched Digital) CSU/DSU	895.
US Robotics Modem Sharing Kit	678.
US Robotics Courier Modem Async	424.
US Robotics Courier Modem Sync/Async	660.

HUBS/CONCENTRATORS

MILAN Micro Hub LE 9 Port	281.
---------------------------------	------

FAX

Trio FAX Single User Software w/USRobotics External FAX/Modem\$ 299.

ArnetFAX for UNIX Software Only	446.
ArnetFAX for UNIX Single-Line	746.
ArnetFAX for UNIX Dual-Line	971.
ArnetFAX w/OrionScanPlus	1,500.
Trio FAX Single User (DOS/Windows)	67.
Trio FAX 2 User Network Edition	168.
Trio FAX Addtl. User Network Edition	76.
US Robotics Sportster FAX/Modem	254.
Zoom FAX/Modem	195.

LAN

Alta EtherTPI-16+ T...\$ 89.

Alta Ethernet Adapter BNC/UTP 16 Bit	99.
TUN TCP/IP 1 User/5 User	112/417.
TUN TCP/IP 10 User/15 User	597/777.

POCKET ADAPTERS

Xircom 3270 Pocket Adapter	409.
Xircom External Ethernet Adapter	485.

WAN

Synchronous solutions offer a very cost effective way for linking PC systems with IBM hosts and X.25 networks.

GCOM X.25 for UNIX w/ ArnetSync Plus\$ 1,700.

ArnetSync/ArnetSync Plus	295/395.
SYNCS/570 RS-232	595.
SYNCS/570 V.35/X.21	750/895.
SYNCS/3000	1,295.
GCOM X.25 for UNIX	1,500.
GCOM X.25 for Windows/DOS	900/800.
GCOM X.25 for UNIX w/SYNCS/570	1,900.
CTI 3780 RJE	761.
CTI 3780 RJE w/ArnetSync	995.

We ship COD company check.
Corporate and Educational POs
accepted.

Network It Right the First Time

MULTIUSER

Ideal for connecting printers, terminals, modems or other serial devices to a 386/486 server for environments including P.O.S., Process Control, Database Servers and Small Business Automation.

MultiPort 8 ISA	521.
MultiPort 8 Micro Channel	671.

MultiPort 4 \$ 371

SmartPort 8 ISA	671.
SmartPort Plus 8/16	896/1,271.
24/32	1,796/2,171.
PortsPLUS 2 Port 115Kb	224.
COMStar Host w/256K	596.
8 Port Asynchronous RJ-45	446.
16 Port Asynchronous RJ-45	671.
8 Port Asynchronous DB-25	472.
2 Port Parallel DB-25	371.
DuoPak Connector	44.
Power DuoPak Connector 115/220V	127/164.
COMStar 16 Port Async Bundle	1,196.
ClusterPort Host w/16 DB-25	1,646.
ClusterPort Host w/16 RJ-45	1,646.
Additional DB-25 Concentrator	1,046.
Additional RJ-45 Concentrator	1,046.
Fiber Link Kit for ClusterPort	446.
TUN Terminal Emulation 1 User/5 User	140/539.
TUN PLUS 1 PC/5 PCs	169/683.
TUN Serial Emulation (Unlimited Users)	225.
AMR UnTerminal 4 User VGA	1,406.
4 User Super VGA	1,929.
8 User VGA	2,738.
8 User Super VGA	3,058.
DoubleVision UNIX Unlimited SCO/ISC	336.
Double Vision 32 User AIX	421.
Double Vision 32 User HP/UX	421.

REPEATER/TRANSCIVERS

MILAN

Micro Twist AUI to 10BaseT	37.
Fiber Man AUI to SMA Fiber/ST Fiber	239/224.
Thin Twist Thimnet to 10BaseT	187.
Any Twist 10BaseT to AUI	149.
Fiber Twist 10BaseT to 10BaseFL SMA/ST 352/337.	
Mini Man Thick Coax Transceivers	112/131.
Multi Transceiver 2/4/8 Ports	112/247/374.
MILAN Repeaters	Starting @ 224.

REMOTE LAN ACCESS

Fast and easy way to connect remote users to your NetWare, Windows or UNIX host PC.



NetWare Connect Bundled w/COMStar 8\$ 2,995

NetWare Connect	
2 User/8 User/32 User	565/2,065/5,685.
CITRIX WinView (10 User)	2,248.
CITRIX WinView w/SmartPort 8	2,775.

PRINT SERVERS



MILAN FastPort 3100 TCP/IP, IPX, EtherTalk Print Server ...\$ 746

• Auto IP/IPX Routing • Auto Login for NetWare • Supports 32 NetWare Servers • Built in 10BaseT, 10Base2 and 10Base5 Transceivers • Parallel speeds to 130+ Kb

MILAN FastPort 3000 Print Server	521.
--	------



**Multiuser Product
Compatibility Guaranteed**
for over 40 operating
environments incl: UNIX,
DOS, Multiuser DOS, OS/2,
CITRIX, PICK, MUMPS,
NetWare and Windows! Call
for more choices.

One Call Does It All

Whether you dial our toll-free sales number between 8 am and 7 pm CST or use our 24 hour toll-free fax order line, we can have the product in your hands or at your customer's site the next day.*

SALES (800) 377-6688

FAX (800) 377-8848

* Next day service available for orders received by 3 pm CST.

Arnet and the Arnet logo are registered trademarks of Arnet Corporation. All other trademarks are property of their respective corporations. Prices subject to change without notice.

routers from different manufacturers sometimes have less likelihood of understanding each other than a Frenchman has of understanding an Albanian.

3COM

3Com's overall router strategy revolves around the remote-office router, which the company calls the "boundary router." Boundary routing is based on the concept that routing intelligence and decision making can be centralized to improve ease of installation. These routers decide whether to forward a packet; they do not need to decide which WAN port to route packets to because there is only one port in operation at any time. A second port is used only for backup in the event of link failure.

Configuration and other network management functions are performed at the central site. Consequently, 3Com claims that boundary routers typically take less than 15 minutes to set up and configure versus hours for conventional routers, a fact that we verified through our testing. (For more information, see "Remote Control Simplifies Remote-Site Routing," *PC Magazine*, September 14, 1993.)

The problem with boundary routing is that it essentially acts as a bridge, passing all traffic across the remote link. New smart filters in 3Com's router reduce the unnecessary NetWare IPX broadcast updates and Service Advertising Protocol updates coming from the central router across the WAN by up to 90 percent, according to 3Com. The smart filters also enable the central site to learn and act upon traffic patterns from the remote site.

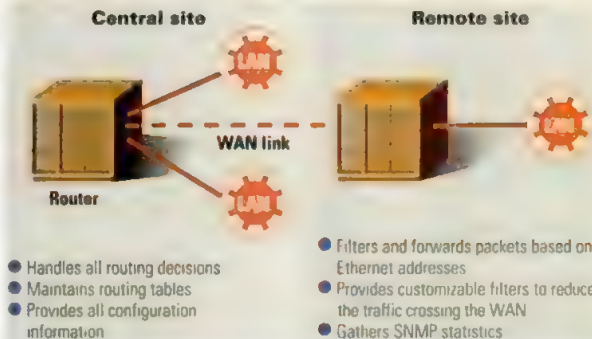
3Com's NETBuilder Remote Control routers are available in Ethernet (\$3,500) and Token-Ring (\$6,000) models. They require you run at least one NETBuilder II router on a central backbone at the central headquarters' LAN site.

NETBuilder RemoteControl supports WAN connections at 2,400 bits per sec-

ond (bps) to 1.544 Mbps and provides a choice among dial-up connections, serial lines, and an external terminal adapter for ISDN. The NETBuilder router family also supports frame relay, dial-on-demand, dial back-up support (including alternative sites), and X.25 (scheduled for second quarter 1994 shipment).

Inside 3Com's Boundary Routing

3Com's routing technology simplifies installation by moving routing intelligence and configuration information to the central router.



While 3Com's NETBuilder family of remote-office routers established a new low-price range for remote-office routers and is an ideal solution for many remote offices, it does have its limitations. One serious limitation is the lack of growth potential. The speed and efficiency gained by using a single port to eliminate router decision-making also creates a potential bottleneck. 3Com's latest product does have a second port that can be activated in the event of overload, but there is still a significant limit to the amount of traffic that can be supported.

CISCO

Cisco's 2500 family of remote-access routers is specifically designed for remote offices that require more sophisticated routing capabilities than are generally found in the low-end routers in this market. Each of the four Cisco 2500 models offers one LAN—Ethernet (\$1,000) or Token-Ring (\$1,500)—port, two asynchronous serial ports, and one asynchronous serial port for dial-up links. Two of the models also have an Integrated Services Digital Network basic-rate inter-

face (ISDN BRI) port.

By June, Cisco hopes the 2500's serial ports will be configurable for either synchronous or asynchronous communications. Cisco reasons that this feature will make it easy for remote offices that grow to migrate from dial-up line to dedicated leased line, which requires synchronous connections.

Cisco offers three different software feature sets: basic IP Router Software (\$1,500), Desktop Router software (\$2,300), and Enterprise Router Software (\$3,000). The basic software includes support for transparent and source-route bridging, wide area network support for X.25, frame relay, HDLC (for IBM mainframe support), Point-to-Point Protocol, and dial-on-demand routing, as well as several additional protocols. The Desktop Router Software provides support for IPX (NetWare), AppleTalk, and DECnet Phase IV. Finally, the third set includes all Cisco-supported communication protocols, routing protocols, WAN technologies, and IBM mainframe protocols.

Regardless of the protocol set selected, Cisco offers its AutoInstall program to make remote-office installation painless as well as its Cisco-Works series of router management applications and other SNMP-based management systems.

While the Cisco 2500 family breaks new ground and establishes a new lower price range for full-featured remote-office routers, the company reportedly is also working on a PC router card for Microsoft's NT Advanced Server. This card will provide routing for a single Ethernet or Token-Ring LAN and offer a number of wide area network interfaces including an ISDN BRI link.

PROTEON

Proteon takes a slightly different approach from Cisco and 3Com. It has integrated its hubs and routers into a family of remote-office solutions called Branch Office SolutionS (BOSS). The Series 90 (\$1,100) is a midrange modular hub supporting

Main Concerns in Selecting a Router

Central router	Peripheral router
1. Extensive protocol support	1. Cost
2. Reliability	2. Ease of configuration
3. Speed	3. Sufficient protocol support
4. Manageability	4. Reliability
5. Ease of configuration	5. Manageability
6. Cost	6. Speed

Modular UPS protection means unmatched reliability for 60% less cost

Introducing MatrixTM UPS for LANs, midrange systems

The challenge: eliminate the tough installation, burdensome service contracts, high lifecycle costs and threat of a single point failure that plague existing midrange UPSes.

The solution: Go to pieces. Package premium power protection in an innovative, intelligent, modular design.



Matrix UPS provides auto-shutdown support of all major network, and midrange OS and also supports SNMP and APC's Measure-UPS which meters temperature and humidity, and monitors smoke, fire, water, and security detectors.

Matrix modularity means reliability

In some midrange UPSes, a small internal failure can bring down the whole UPS, and your system with it.

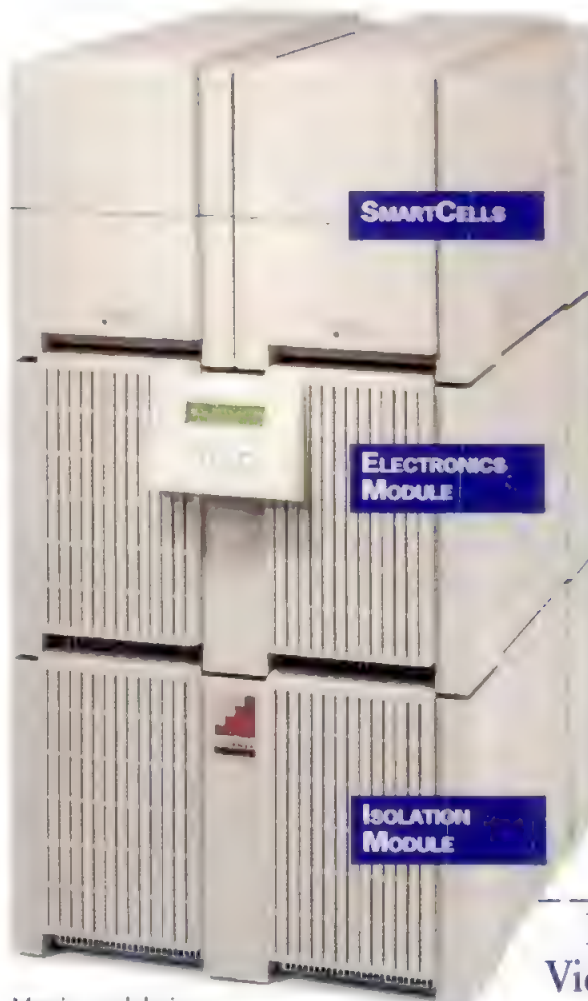
In contrast, the Matrix- "100% Uptime" design isolates any problems to their 'block' which can be diagnosed and hot swapped-out while the protected system stays up and reliable.

No downtime. No service delays. No unnecessary risk. The fact is, Matrix delivers plug-and-play reliability no other UPS can match.

Matrix modularity means low operating and lifecycle costs

When you're rightsizing to conserve cash, the last thing you need is a UPS that wastes it.

Small footprint and low weight (each module can be shipped overnight) means Matrix can be hot-swapped out by even untrained personnel without the cost or delays of a service call.

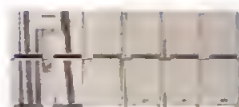


Matrix modularity doubles expected battery life, saving you replacement costs, and operates at 93% efficiency, so you save electricity and cooling costs as well. In fact, over a 5 year lifecycle, Matrix costs up to 60% less than same-sized UPSes... savings you can't afford to ignore.

Fax for your free video!

3000 and 5000 VA protect up to 22 servers or 2 midrange systems

■ Hot-swappable modules for 100% uptime, 60% lower lifecycle costs



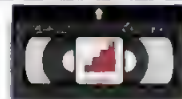
■ Microprocessor-controlled, zero-maintenance SmartCells end expensive service contracts. For more runtime, simply add SmartCells.

■ SNMP support and automatic server shutdown (for NetWare, UNIX, NT, OS/400, VAX, Sun and more) protects data, lowers LAN support costs.

■ Environmental and power monitoring provides "glass room" level security.

■ Two-year warranty, \$25,000 Lifetime Equipment Protection Guarantee (see details)

Free Video!



Simply fax us your business card and tell us which brand of UPS you currently use and your free Matrix UPS video will be sent straight away.

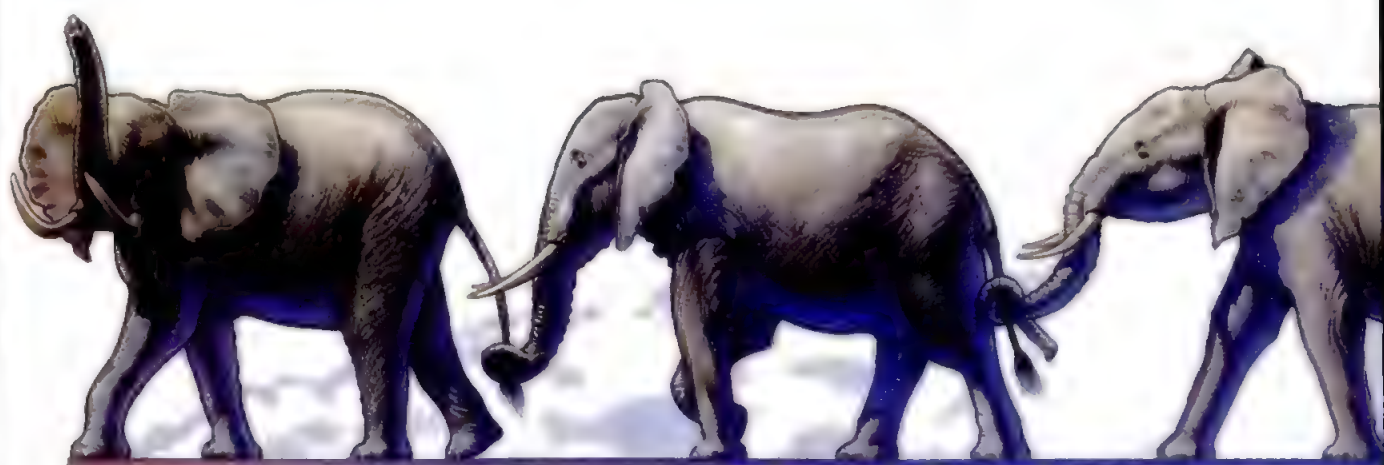
APC

AMERICAN POWER CONVERSION

800-800-4APC

APC EUROPE (+33) 64623900 / ASIA/PACIFIC FAX: 401-789-1631 / L. AMERICA FAX: 401-788-2716 / Computer: GO APCSUPPORT

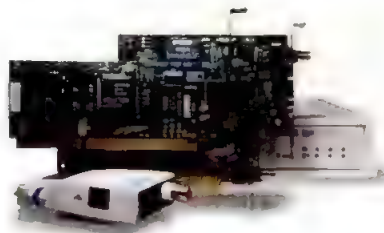
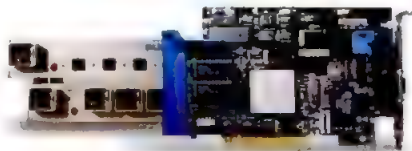
CIRCLE 915 ON READER SERVICE CARD



OUR LARGE STRIDES IN MEMORY

Token Ring.

TokenRx. A line of Token Ring network adapters and multi-station access units that feature on-site support by IBM's own Customer Engineers. The adapter cards feature 100% IBM driver compatibility, the IBM designed TROPIC chip and a retail price of less than \$400.

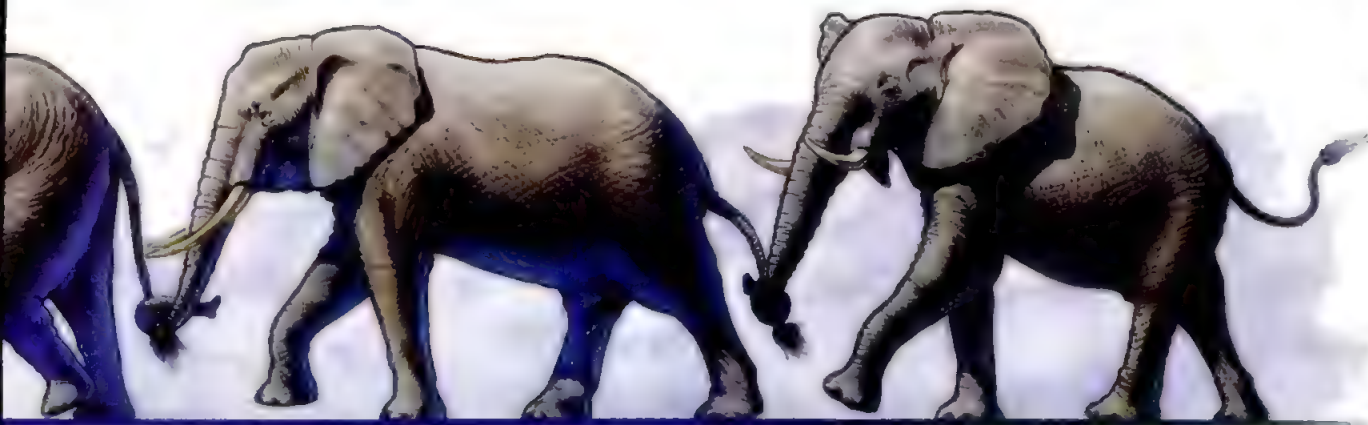


Ethernet.

Our ElbeRx family of ISA and EISA Ethernet network interface cards, dual interface pocket adapters, concentrators and transceivers provide solutions for a wide range of Ethernet connectivity needs. With uncompromised reliability and compatibility plus value pricing, ElbeRx is the ideal Ethernet choice.

PCMCIA Ethernet Cards.

At less than \$200 retail plus industry leading performance, ElbeRx PCMCIA cards are setting new standards for portable connectivity. They are available in 10Base-T and 10Base2 versions, support the widest range of Type II compliant notebook, laptop and desktop systems and are compatible with all popular network operating systems.



HAVE LED US INTO NETWORKING

Certified Compatibility.

 Kingston networking products are certified compatible with Novell Netware, Microsoft Windows for Workgroups and LANManager, Artisoft LANtastic and support every other popular network operating system including IBM OS/2 Extended Edition and Banyan VINES.



Kingston Reliability.

Network users enjoy the same reliability customers have come to expect from Kingston memory and processor upgrades. Every product is individually tested prior to shipping, supported by free comprehensive technical assistance and is backed by a five-year warranty.

More Information.

For more information on the Kingston line of networking products, contact your nearby Kingston dealer or call (800) 435-2620, (714) 435-2600 or fax (714) 435-2699. In Canada: Dynatech, Ltd. (416) 636-3000 or in

[800]

Mexico: MPS Mayorista 325-09-93 or Ingram Dicom 328-11-11.

PC MAGAZINE CIRCLE 921 ON READER SERVICE CARD

Kingston
TECHNOLOGY CORPORATION

THE INSIDE NAME IN UPGRADES

All Trademarks Registered Trademarks and Logos are of their respective holders

from 5 to 100 Ethernet and Token-Ring users. The Ethernet configuration consists of 20 10BaseT connections while the Token-Ring version comes with 20 unshielded twisted-pair wire ports. There is SNMP support so that network administrators can monitor and manage the BOSS remotely from a centralized location.

The BOSS products all contain a router that supports the major network operating systems including NetWare's IPX/SPX, TCP/IP, and over 17 protocols as well as the major industry standards for wide area network connections such as the Point-to-Point Protocol. Both Ethernet and Token-Ring modules have an integrated DNX, which is Proteon's bridge/router, with dual WAN ports supporting speeds ranging from 9.6 Kbps to 1.544 Mbps. Frame relay and X.25 support are available as separately priced options.

The BOSS consolidates 3270 traffic with Token-Ring LANs over a single WAN connection. So, it's great for small offices that need to access corporate mainframes.

WELLFLEET

Not surprisingly, Wellfleet Communications, Cisco's chief competitor, is about to jump into the remote-office arena with its Access Node (AN) line.

These routers are designed for small network sites with limited growth potential. The AN offers two WAN connections. Despite being Wellfleet's low-end (\$2,300) product, this router is designed for a multiprotocol environment and supports all the major LAN and WAN protocols. Basic protocols come with the Access Node, while the router with Wellfleet's complete bundle of protocols is available for \$3,400. The Access Node can be managed via SNMP from a central location using Wellfleet's Site Manager network management software.

To simplify installation, Wellfleet offers EZI or Easy Installation. With EZI, Wellfleet configures the AN to learn its own TCP/IP address from the router at the central site. Once that is learned, the AN can download its configuration from

a server on the network using the BootP application.

Wellfleet positions the Access Node as the remote-office router for offices that can't afford to be cut off from central headquarters. The router's two synchronous nodes can be configured for redundant connections to one site to provide higher bandwidth and assure continuous operations should one connection fail.

Alternatively, one synchronous link can be established with another remote office so that data can be routed back to central headquarters even if the direct connection fails.

By weighing cost, installed base, manageability, protocol support, and expandability, you'll find the right router for your site.

DR. STAN SCHATZ IS DIRECTOR OF LAN ANALYTICAL SERVICES FOR COMPUTER INTELLIGENCE INFOCORP AND HAS WRITTEN 24 BOOKS ABOUT NETWORKING AND THE COMPUTER INDUSTRY.

The Very Best in Network Management



Frye Computer Systems has been developing award-winning LAN management and PC support tools since its inception in 1988. We've proven to be the best time and time again.

#1 in Info World
#1 in LAN Magazine
#1 in NetWare Solutions
#1 in PC Magazine
#1 in PC Week

LAN Management
**NetWare®
Management™**

Monitoring
**NetWare® Early
Warning System™**

Inventory
**LAN
Directory™**

NLM Scheduling
**NetWare®
Console Commander™**

File/Software Updating
**Software Update and
Distribution System™**

Node Management
**Node
Tracker™**

Frye Frye Computer Systems, Inc.
17 Terrace Street, Boston, MA 02111 (617) 451-5400 FAX (617) 451-6711

Free Test Drive Software
1-800-234-3793 ext. 594

LAN Manager Users: QEMM 7 makes Windows for Workgroups more efficient ask your dealer or call for more information

Spot the Difference and Win



Our memory manager for standalone PCs



Our memory manager for networked PCs

Spot the difference?

No?

Good. There isn't one.

QEMM is the world's #1 memory manager for both networked and standalone PCs. Either way, you win.

According to Personal Computer Magazine, QEMM 7 is 'the King' of memory managers; it's everyone's favorite PC utility.

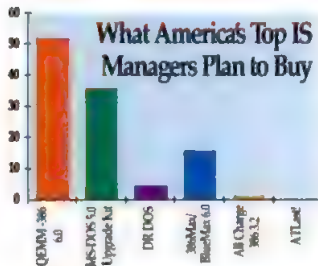
You need every last 'K'

If you've run out of memory and reached the end of your tether, QEMM can find the vital breathing space that all PCs need. And that, of course, includes every PC on a network.

QEMM 7 delivers as much



We tested DOS with and without MemMaker and with QEMM 6 and our new QEMM 7 runs away from all of them. See details of test conditions below.



Last year, COMPUTERWORLD magazine surveyed top IS Managers. In the DOS memory management category, QEMM ranked first in Best Technology, Best Price/Performance and Best Documentation. No wonder it was also ranked first in "plan to buy."

conventional (0K-640K) memory as possible by safely relocating your network drivers, CD-ROM driver, disk cache, mouse driver, anti-virus software, disk compression driver, etc, into vacant memory space above the precious 640K region.

The areas in conventional memory that were once occupied by all those hungry utility

programs are now free for you to use as you please. You should find yourself with 634K free at the DOS prompt! Consider that one byte can make the difference between a program that runs—or doesn't. That makes every single 'K' of RAM precious.

Networking not working? Try QEMM.

Nothing could be simpler than integrating QEMM 7 with your network. QEMM automatically calculates millions of possible memory configurations to ensure that your PC is configured for optimum performance.

QEMM 7 employs its patented Stealth technology to give you more free memory than ever before. Stealth now saves room to allow you to install a network, use all of MS DOS 6's utilities (such as SMARTDrive, DoubleSpace and VSafe), free 8K-24K extra memory for peak Windows performance,

install a mouse, sound card and CD-ROM, and still have more than 630K to run the largest of applications.

Compatible with your network.



QEMM works happily with all types of network hardware: 3COM, SMC, Intel, D-Link, Eagle, LANtastic.

And QEMM supports all types of network software, too: Novell NetWare and NetWare Lite, LAN Manager, TCP/IP networks like PC/TCP and PC/NFS... you name them!

QEMM 7 is available now for individual PCs, and in 10 and 50 Network MultiPacks. Call Quarterdeck now for full details, and the location of your nearest authorized dealer.

Standalone or networked PC, either way, you win with QEMM.



Quarterdeck

Quarterdeck Office Systems, 150 Pico Boulevard, Santa Monica, CA 90405 (310) 392-9851 Fax (310) 314-4219

How we got the chart numbers: CPU—486/33 ALU Power/business VESA machine equipped with 16 megs of RAM and running MS-DOS 6. Comparisons were done using the following memory managers: QEMM 7, QEMM 6.02, MS-DOS 6 MemMaker. In addition to the driver (or drivers) required by each memory manager, the following drivers, DOS resources and programs were loaded for all comparisons: in the CONFIG.SYS file: SETVER.EXE, DOS=HIGH, FILES=30, BUFFERS=10, STACKS=90, MVSOUND.SYS, SNDX12.SYS, SLCD.SYS, DOS SHELL—statement, in the AUTOEXEC.BAT file: VSAFE, MSCDEX, UNDELETE, LSL.COM, NE200.COM, IPXODI.COM, NETX or EMBNETX, MOUSE.COM, SMARTDRV.COM, PHYSICAP.COM. ©1994 Quarterdeck Office Systems. Trademarks are property of their respective owners.

CIRCLE 904 ON READER SERVICE CARD

Stack to the future.



Introducing the HP AdvanceStack family of 10Base-T stackable hubs.

If you like the front of our new hubs, wait until you see the back. That's where you'll find their unique expansion slot, and proof of their unprecedented flexibility. Buy the HP AdvanceStack today and you

get a low-cost solution for your current setup. Then when you want additional functionality, all you need is a cost-effective expansion module, not a new unit. Add a life-

- Full stack manageable via a single SNMP module
- Supports HP OpenView network management software
- Each hub ships with HP Stack Manager, a Windows-based management solution
- Management bus separate from data bus
- Maximum configuration: 784 nodes, 16 hubs
- Available in 12-, 24-, and 48-port models
- Hub-to-hub connections via industry standards-based cables
- 185-meter hub separation capability
- Hot-swap capabilities
- 1960 RISC processor
- MTBF: 274,000 hours (12-port model)
- Starting under \$50/port



The HP AdvanceStack features an expansion slot that offers a flexible upgrade path to SNMP bridging/routing, high-speed backbone connections and more.



time warranty* backed by HP's reputation for quality and reliability, and we think you'll want to find out more about AdvanceStack right away. For fast faxed information, call 1-800-964-0714, or for a full product brochure, 1-800-533-1333, Ext. 8117. And discover why so many people are looking in back of the stack—AdvanceStack, that is.

Another smart networking product from HP.



**HEWLETT®
PACKARD**

*Customer must return warranty registration card to HP Five-year on-site warranty, after five years return hub to HP. Power supply and fan covered by five-year on-site warranty only.
†In Canada call 1-800-387-3867, Dept. 190. ††Based on U.S. list price of 4/1/94. ©1994 Hewlett-Packard Company RND008

FIRST LOOKS

HANDS-ON EVALUATIONS OF THE NEWEST NETWORK PRODUCTS

► WORKGROUP NETWORKING

ZDS Simplifies Server Setup for Workgroups

BY O. RYAN TABIBIAN

The most difficult component to set up of a small office or workgroup network has traditionally been the server. Loading the software and configuring the peripherals normally takes about an hour or more. But now, thanks to the ZDS Z-Stor server, you can get a Personal NetWare workgroup up and running in about 5 minutes. The 486-based Z-Stor comes loaded with Novell's Personal NetWare and includes a built-in Ethernet adapter and SCSI controller to make setup as painless as possible. However, it offers limited RAM and hard disk space, less than stellar performance, and supports no network operating systems other than Personal NetWare.

The Z-Stor is a small server intended for offices or workgroups of 20 to 25 users typically within larger NetWare 3.x or 4.x environments. The Z-Stor was designed to provide exceptional ease of installation, which it does. On the other hand, it is not intended to deliver great performance, and it does not.

The Z-Stor is available in two models: the 400, which we tested, and the 1000. The 400 is based on a Cyrix 486SLC25 processor and includes an unexpandable 2MB of RAM, a 250MB hard disk (that comes compressed to support 500MB using Stac Electronics' Stacker), one Ethernet port, and one SCSI port. The only difference between the 400 and the 1000 is that the latter includes a 500MB hard disk, which also comes doubled via Stacker and can be

added to the 400 as a replacement disk. Both models also contain a 1MB disk cache, a PCMCIA Type II slot, and two available 5.25-inch drive bays.

Since the server contains no keyboard or monitor connections, it must be managed from one of the workgroup PCs. From the PC, you can transfer files to and from the Z-Stor, change the configuration of Personal NetWare (although Zenith recommends against this), and adjust the size of the disk cache. For workgroup management features,

such as changing passwords and checking server utilization, you can use Personal NetWare's built-in utilities.

Continues on page NE14



NETWORK IN A BOX: The Z-Stor comes completely preconfigured for exceptional ease of installation.

► ENTERPRISE HUBS

SynOptics: Still the King of Hubs?

BY O. RYAN TABIBIAN

The efforts of a market leader are usually worth a serious look, and SynOptics' latest hub is no exception, though you may be surprised by what you see. The Lattis System 5000, SynOptics' new high-end enterprise hub, has the ability to move clients between segments without touching their network cables, marking a major step forward for the product line, if not for hub technology. However, the step may not be big enough to maintain SynOptics' market position, with Optical Data Systems and Chipcom both offering serious challenges.

The Lattis System 5000 is a 14-slot hub

that is designed to consolidate most types of network media in a single, manageable enclosure. Through the vendor's Unix-based Optivity management application, which must be purchased separately, the 5000 offers a per-port switching feature that allows network administrators to move users from one network segment to another without having to physically change the wiring setup. The 5000 also offers strong scalability with as many as 52 Ethernet, 26 Token-Ring, and 5 FDDI segments on three individual backplanes. By the end of 1994, SynOptics plans to offer support for Ethernet packet switching and ATM.

Continues on page NE18

Zenith Data Systems

CONTINUED FROM NE13

The setup and installation procedures easily lived up to Zenith's boasts: Our total setup time was about 5 minutes. We just took it out of the box, connected the Ethernet cable to our workgroup hub, and plugged in the power cord. The lack of a keyboard and monitor makes installation that much easier.

Zenith claims that the Z-Stor is very reliable because it has fewer discrete components than other PCs. By leaving out the keyboard and monitor, for example, Zenith eliminates two mechanical points of failure and helps to prevent unauthorized server access at the same time. Zenith also claims 35,000 hours—roughly four years—mean time between failures. The Z-Stor is also backed by a three-year warranty with one year of on-site support.

Because it uses Personal NetWare instead of other, more popular peer-to-peer LANs, such as LANtastic or Windows for Workgroups (WfWG), the Z-Stor is aimed at two specific markets: workgroups that require access to larger NetWare networks and those sites that run Personal NetWare as a standalone network. (For a complete review of Personal NetWare, see "Peer Pressure," April 26, 1994.) Even though Personal NetWare provides a seamless integration with NetWare 3.x and 4.x, it may not be the best peer-to-peer choice since LANtastic and WfWG both also integrate nicely with NetWare and offer more features, such as built-in e-mail and scheduling. But users are given no choice in the matter: It's Personal NetWare or nothing on the Z-

Stor. Even if you could load a different OS, many are not compatible with the Z-Stor's limited RAM. WfWG, for example, requires 3MB RAM on servers and peers.

Benchmark Tests: Workgroup Servers



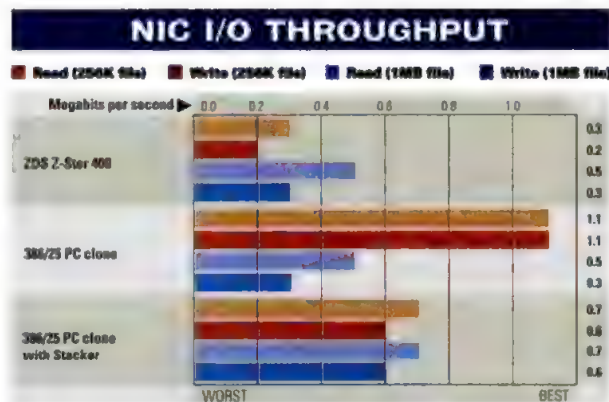
The 486-based ZDS Z-Stor 400 did not perform as well as the 25-MHz 386-based PC clone we tested for comparison. ZDS claims that the use of Stacker, which is included with the Z-Stor, can adversely affect performance, but the 386's

scores improved

when it used Stacker. We found that a combination of inefficient cache utilization and memory limitations caused the Z-Stor to lag behind the 386.

The NIC I/O Throughput test from NetBench 2.1 evaluates the amount of data that an adapter can transfer across the network in 1 second. A PC equipped with the adapter issues read and write requests to a file stored in the server's 1MB cache.

The test uses 256K and 1MB file sizes.



PERFORMANCE AND SUITABILITY

Overall, the Z-Stor's results were not as good as our baseline results—those of a generic 25-MHz 386 with 4MB RAM and 1MB cache—on the I/O Throughput tests. In fact, the 386 was about three times as fast

as the Z-Stor when transferring 256K files. Zenith claims that the reason for this is the use of Stacker, which can degrade performance by as much as 20 percent because it involves the extra processes of breaking down the data for disk writes and rebuilding it for accesses. The 20 percent degradation is less noticeable on a client PC than it is on a server where multiple clients have an additive effect on the decrease. When we loaded Stacker on the 386, however, it still transferred files almost twice as fast as the Z-Stor and its results on large (1MB) files actually improved.

Our tests revealed two other reasons for the less-than-spectacular performance: memory limitations and an inefficient use of cache. The Z-Stor's 2MB RAM is unexpandable and is probably too small for workgroups with more than 25 users. Also, the 1MB cache is nice, but it had no recognizable effects on performance during our tests.

The Z-Stor is competitively priced and extremely easy to set up. Personal NetWare's integration with its more powerful cousins makes the Z-Stor a good choice for workgroups within NetWare 3.x and 4.x environments. However, if you're concerned with performance or want to run a different peer-to-peer LAN, you'll be better off using one of those almost-forgotten 386s as your workgroup server.

• List price: ZDS Z-Stor: Model 400, \$999; Model 1000, \$1,500; Zenith Data Systems, 2150 E. Lake Cook Rd., Buffalo Grove, IL 60089; 800-553-0331; fax, 708-808-4434.

Circle 960 on reader service card

■ Other Pieces of the Puzzle

One server, even if it is easy to install, does not an Ethernet network make. To form even a small network, you'll also need adapters, a hub, and cabling.

Many adapters, such as Olicom's EtherCom (\$85; 214-423-7560), allow you to complete often complicated tasks, such as adjusting IRQ settings, through software configuration instead of forcing you to fumble with minuscule switches on the adapter.

Stackable hubs, such as Fibermux's SnapLAN (\$3,995 to \$6,495; 818-709-6000), are perfect for small LANs because they are much cheaper than chassis-based hubs and easier to set up.

Simplified network cabling systems, such as Tut Systems' Silver Streak (\$99 to \$199; 800-998-4888), which uses low-cost phone wire instead of UTP to connect Ethernet nodes, complete the picture.

How much work could a workgroup do if a workgroup could work grouped?



It may be the riddle of the computer age, but now there's a new product with the answer you've been waiting for.

Introducing Personal NetWare. It's a "personal" network you

can add to NetWare that allows you to directly access the resources and people in your workgroup running DOS or MS Windows. You can capitalize on individual desktop

resources like laser printers or CD-ROMs by sharing them among the people using Personal NetWare.

And Personal NetWare is easy to manage because it includes desktop SNMP management. Plus, Personal NetWare offers you the same security you've come to rely on in NetWare.



New Personal NetWare.
Bringing workgroups
closer together

New Personal NetWare works with what you've already got to create a computing environment that helps your workgroups work better together. If that sounds good to you, call 1-800-554-4446 for a free demo disk or, if you prefer, get the facts by fax at 1-800-NETWARE, and request document #9013. You'll be surprised at how much work workgroups can do once they're working grouped.



NOVELL. The Past, Present, and Future of Network Computing.



Putting I m a g i n a t i o n



AIC © Digital Equipment Corporation. 1994. Digital, DECclass, and the DIGITAL Logo are trademarks of Digital Equipment Corporation.
PCL is a registered trademark of Hewlett-Packard Company.
PostScript is a trademark of Adobe Systems Inc. AppleTalk is a registered trademark of Apple Computer Inc.

Introducing The DEClaser 5100. The New 600 dpi Network Printer That Can Play On Any Team.

Now, from the leader in network printing, comes an exceptional 8 ppm laser printer offering unmatched performance, high-resolution graphics and expandability. The new DEClaser™ 5100. Designed to handle anything with an all-star line-up of features. Like a RISC processor, graphical coprocessor and Digital's Intelligent Printing System to deliver the fastest first page in the industry. Standard 600 dpi, upgradeable to true 1200 dpi for superb image quality. Simultaneously active serial, bi-directional parallel and AppleTalk® ports, and a built-in network interface slot for multiprotocol Ethernet or Token Ring connectivity. Two PCMCIA Type II slots and a user-installable optional hard disk for additional fonts and forms.

Plus EPA "Energy Star" compliance to save you energy and money. How can you get network printing's MVP

on your team? Just call 1-800-777-4343 to order your DEClaser 5100 today, or for the name of your local reseller. Outside the U.S., contact your local Digital Sales Office.



*Network Printers From Digital.
Designed To Handle Anything.*

DEClaser 5100 includes:

- 8 ppm, 600 dpi (1200 dpi optional)
- Adobe PostScript® L2 (73 fonts)
- PCL® 5E support (47 fonts)
- RISC and graphical processors
- Serial, parallel and AppleTalk® ports
- EPA "Energy Star" compliant
- 2 PCMCIA Type II slots
- Optional Ethernet card
- Optional internal hard disk

To Work

digital

SynOptics Communications

CONTINUED FROM NE13

Per-port switching is not new to the hub market. But we found SynOptics' implementation very easy to use: We simply clicked on a particular client and dragged its icon to another segment on the network map. The alternative is to switch the cables on the hub, which is both inconvenient and time-consuming. By supporting per-port switching on Ethernet, Token-Ring, and FDDI segments, the 5000 offers a level of flexibility that can be very beneficial in network environments where clients are frequently added or moved.

The per-port switching technology is different from packet switching, which is the type employed by Kalpana's Ether-Switch. Packet switching enhances Ethernet performance by providing a dedicated 10-Mbps channel for every client. Per-port switching is convenient and makes changing the network configuration easy, but it does not affect performance.

The 5000 faces competition from Optical Data Systems' Infinity 1095 series and Chipcom's ONcore hubs, among others. The Infinity, which also supports per-port switching, offers a wide range of media modules, including a currently available ATM switch and an Ethernet packet switch module. The Infinity offers two fewer slots (12) than the 5000 (14), but otherwise stacks up very well, with more extensive media support and a lower price per port. The 17-slot ONcore also compares well: It offers both per-port and packet switching and supports the modules for Chipcom's ONline hub, which is the rough equivalent of the SynOptics Lattis System 3000, until now the top of its line. The ONcore, however, does not support nearly as many network segments as the 5000. The Cabletron MMAC Plus will also challenge the 5000 in the enterprise hub market, but it will not ship until later this year.

Unlike ODS and Chipcom, SynOptics



A SWITCH FOR SYNOPTICS: The Lattis System 5000 is the first SynOptics hub to support per-port switching.

does not support an internal routing module for the 5000, which means that a standalone external router is required to allow for communications between the different media types.

Some alternatives to internal routing

Enterprise Hubs

YES = ■ NO = □	Chipcom ONcore Switching Hub	ODS Infinity 1095, ODS Infinity 1095S	SynOptics Lattis System 5000
Chassis with one power supply	\$6,995	\$5,000	\$4,995
Price per port	\$230	\$98	\$205
Maximum number of unmanaged Ethernet ports	384	576	336
GENERAL FEATURES			
Number of slots	17	12	14
Network management application	ONdemand Network Control System 3.0	LanVision 1.0	Optivity 4.0
Per-port switching	■	■	■
Hot-swappable modules	■	■	■
Maximum number of power supplies	2	2	3
MODULES			
Ethernet (segments supported)	■ (8)	■ (48)	■ (52)
Packet switching	■	■	□
FDDI (segments supported)	■ (8)	■ (4)	■ (5)
Token-Ring (segments supported)	■ (17)	■ (48)	■ (26)
ATM	□	■	□
Bridging	■	■	□
Routing	■	■	□

can lead to higher per-port prices. Other competitors, including Cabletron and Lannet, provide inter-media communications through a common cell-based backplane, in which each module is equipped with a powerful—but expensive—processor that breaks down the data from one media type into a common format that the other media modules can recognize.

MANAGEMENT

Optivity, Version 4.0, is a powerful, easy-to-use SNMP (Simple Network Management Protocol) application for the Sun-Connect SunNet Manager platform. Optivity (\$5,000) provides a host of management features, including disabling and enabling ports, as well as SNMP statistics such as reports on bad packets (see "SynOptics Brings Hub Management to NetWare," August 1993, for a review of Optivity for Novell's NetWare Management System). The application's strongest feature is the way it reports statistics: Optivity's graphical interface is very easy to navigate.

In order to obtain port statistics such as traffic analysis information and packet collision data from individual modules, you must use additional management modules and data-collection engines (DCEs). The management modules occupy a full slot in the hub, and the DCEs are cards that plug into any of the media modules to report network traffic statistics back to the management modules.

The Lattis System 5000 is a major step forward from SynOptics' previous high-end hub, the 3000. The combination of per-port switching, scalability, and exceptional manageability mark the 5000 as a serious contender, but other hubs, especially the Infinity 1095 and the ONcore, are equal to the challenge.

• List price: *Lattis System 5000*, \$3,995; *power supply*, \$1,000; *supervisory module*, \$1,000; *Ethernet module*, \$4,595; *Token-Ring module*, \$5,995;

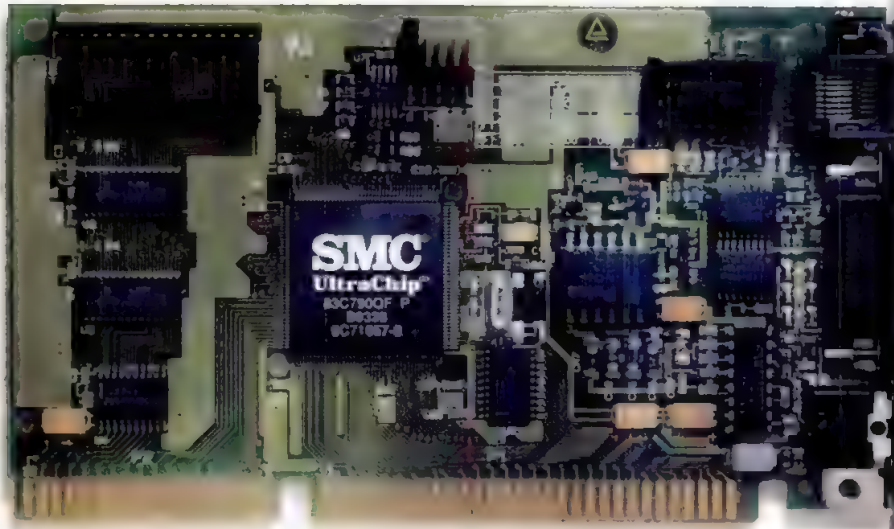
FDDI module, \$13,795; *Ethernet management module*, \$5,395; *Token-Ring management module*, \$6,995; *FDDI management module*, \$16,995.

SynOptics Communications Inc., 4401 Great America Pkwy., Santa Clara, CA 95052-8185; 800-776-6895; fax, 408-988-5525.

Circle 962 on reader service card

Unparalleled.

No other Ethernet adapter in the world offers all of this.



it requires no proxy agent. So now, no matter what operating system you use, network management can be simple and easy.

The new Elite Ultra raises the standard for performance while lowering prices by 27%.

This is perhaps the biggest news behind the new Elite Ultra. While performance has soared, prices have plummeted. Available in multipacks to maximize savings, the Elite Ultra is priced

27% less than its predecessor and starts as low as \$109. That makes it clearly the best value in the entire industry. And it is available in four configurations — coax, twisted pair, combo and EISA combo.



Call 1-800-SMC-4-YOU for a special Elite Ultra evaluation kit.

For just \$99 we'll rush you an evaluation kit* that includes 2 Elite Ultra Combo adapters, an EZStart Demo Disk and the latest independent reviews of the Elite Ultra. You'll also receive our whitepaper "UltraChip with SimulTasking." Call to find out why everybody agrees — when it comes to Ethernet, the new Elite Ultra is simply unparalleled.

SMC
STANDARD MICROSYSTEMS CORPORATION

The blazing speed of the new EtherCard Elite Ultra™ adapter is only the beginning. When you look at everything else the Elite Ultra offers, you'll see why PC Magazine said "a fortunate combination of good performance, low price, and an outstanding feature set make the EtherCard Elite Ultra an excellent choice."

The new SMC UltraChip shatters speed records.

Simultaneous pipelined data transfers. That's the simple idea behind SimulTasking. Special dual-port buffers allow the Elite Ultra to begin packet transmission to the host PC — even before the entire packet has been received. The result is



greatly reduced packet turnaround time and much higher throughput.

EZStart Software makes installation a breeze. (PC Week and LANQuest Labs agreed it's easier than 3Com.)

To be exact, PC Week said "SMC's Elite Ultra wins the prize for easy installation." EZStart™, a Windows-like autoconfiguration and test utility, automatically configures, tests, and even loads driver files. It makes installation and troubleshooting a snap. In fact, LANQuest Labs rated it "head and shoulders above" the competition.



A free SNMP agent makes network management really easy.

Our free SNMP agent — PC Agent — brings network management to the desktop. And since PC Agent is true SNMP,

Introducing the new Elite Ultra.

*Offer is limited to one per customer, while supplies last. U.S. dollars. SMC and Standard Microsystems are registered trademarks and EZStart is a trademark of Standard Microsystems Corporation. The Compaq Qualified Solution Logo is a trademark of the Compaq Computer Corporation. All other registered trademarks are the property of their respective holders. © 1993 Standard Microsystems Corporation. PC Magazine, December 21, 1993, PC Week, November 15, 1993.

CIRCLE 909 ON READER SERVICE CARD

► CELLULAR MODEM

Hit the Road with the PC Card

BY MICHAEL RYAN

The whole idea behind wireless modems is to make life on the road easier for the business traveler. Unfortunately, most of these modems tie users to limited service areas and proprietary wireless networks that offer only e-mail and require dedicated front-end software; in other words, they don't yet make traditional land-line modems obsolete. Nokia offers a modem with none of these restrictions: Its PC Card is one of the first PCMCIA fax modems that lets you use the public cellular network to transmit data. Like other wireless solutions, however, the PC Card is not as reliable as a land-line modem for applications other than e-mail and faxing.

The Nokia PC Card is actually AT&T Paradyne's KeepInTouch (KIT) Card Type II PCMCIA fax modem with

enhanced code that allows for cellular communications. It is compliant with PCMCIA Release 2.0 and includes a cradle adapter to connect to Nokia 121 and PT128 cellular phones. A standard wall-jack connector is

MOBILE MODEM: The PC Card lets you send data and faxes using Nokia cellular phones.

also provided so that you can use the modem over a regular phone line. Any communication software package can be used with the PC Card.



The primary difference between services, like the packet-radio network used by RAM Mobile Data, and cellular is the wide availability of cellular service. RAM offers good coverage only of metropolitan areas. Cellular service is available just about everywhere.

Also, accessing the RAM network requires the use of a radio modem—such as the Ericsson GE Mobidem (\$795), and special software—such as AirSoft's AirAccess, and no option is available to connect to standard phone lines.

One possible disadvantage of the PC Card is the cost of cellular service, which, on average, costs more than packet-radio service. Though the prices of both RAM Mobile Data packet-radio service and cellular service start at \$25 per month, they quickly diverge. While RAM Mobile service may seem more expensive

So, you must be the guy in charge of software licenses.

It's a delicate balance. On one hand, you need enough application licenses to stay legal. On the other hand, you could waste money buying too many.

So what can you do? It's AppMeter to the rescue. AppMeter is the application usage metering software that not only gives you total control over access to applications on your Novell network, but also gives you more powerful, easier to use reporting than you'll find anywhere else. So you always have the information you need to make intelligent decisions about buying—or not buying—additional licenses.



patterns over time. Instant bar graphs that track daily usage, comparing license demand levels to licenses owned. On-screen and printed reports that make it simple to document compliance, justify purchases, and maximize your investment in the licenses you own.

Best of all, AppMeter is field proven for reliability and ease of administration by thousands of people who used to find

themselves in the same position as you.
**Call now for complete information
 and a free demo disk.**

1-800-828-4146 Ext. 21 (US & Canada)



You get summary or detail reports that show peak concurrent usage of applications, as well as usage



System Requirements: Requires Novell NetWare 3.1x or above, or NetWare 386. Includes VAP and NLM. No TSR required. AppMeter is a trademark of Funk Software, Inc. © 1994 Funk Software, Inc., 322 Third Street, Cambridge, MA 02142. Tel (617) 497-0339 Fax (617) 547-1031. Developer tested only. Novell makes no warranties with respect to this product.



"SPA accepts AppMeter reports for purposes of assessing software license compliance."
 — Ken Wasch, SPA Executive Director



PUT IT IN YOUR

PC.

PUT IT IN YOUR

SERVER.

PUT IT IN YOUR

WILL.

With their unparalleled reliability, you can count on Proteon ProNET-4/16 Plus Token Ring adapter cards to last a lifetime...and then some. Which is exactly why we can back every one with our full Lifetime Warranty. Simply put, you can have confidence in Proteon adapter cards, because they're an investment that

All ProNET Token Ring adapter cards also come backed with our 100% Interoperability Guarantee. So whether you use them in your individual PC or in your server, they're totally compatible with any network operating system, hardware environment or application software you may have up and running. Otherwise, we'll refund your money. It's the ultimate combination of dependability and award-winning performance. And

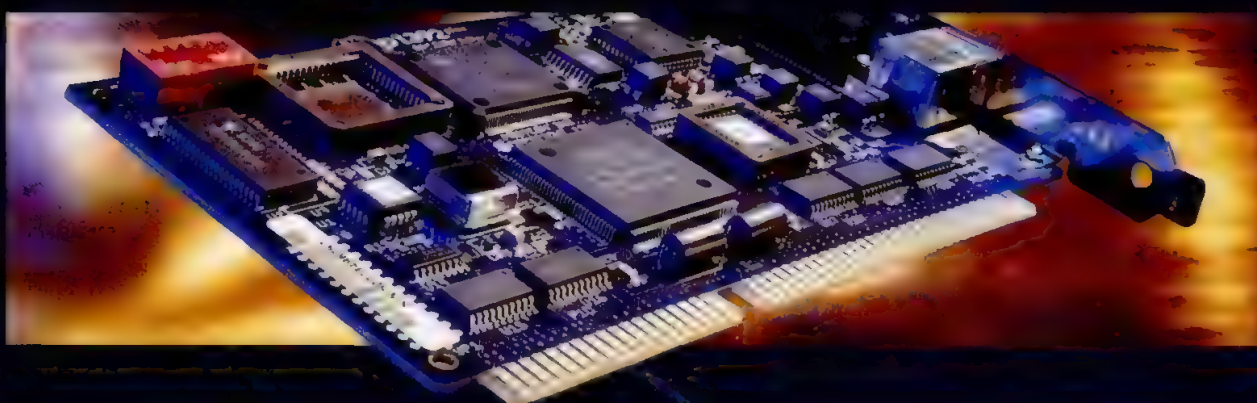
only Proteon has the technology to deliver it to you in writing.

In addition, these Proteon ProNET Token Ring adapter cards are totally software configurable, so installation is refreshingly simple. Plus, they're available for ISA, EISA and MCA architectures.

All of these features will undoubtedly add up to make your job a whole lot easier. Namely,

by providing you with the most reliable and versatile Token Ring adapter card available. So call 1-800-830-1300, Dept. 400 (or fax 508-366-8901) to get the facts on the ProNET Series cards and their unrivaled warranty/guarantee. Then look into getting a Proteon ProNet adapter card for your system. Put it in. Put it to work. And put it out of your mind.

proteon



(the maximum monthly charge is \$135, where the typical maximum monthly cellular charge is \$60), cellular service often carries additional charges. The difference is that cellular service incurs charges for long distance and roaming (when the phone is used outside the user's home area). However, your cellular expenses cover the use of the modem *and* a phone. Both provide some free usage with each pricing plan.

Nokia is not the only vendor that recognizes the advantages of sending data over cellular networks. An upcoming Megahertz Corp. product will utilize the Microcom Networking Protocol-10 (MNP-10) for cellular data communications. The PC Card is based on AT&T's Enhanced Throughput Cellular (ETC) protocol, which is supposed to provide better performance and more error-free data than MNP-10. However, since no MNP-10 cellular modems were shipping at the time of this review, we were unable to test that claim. Motorola's upcoming CELlect 14.4 cellular modem will use a

new proprietary protocol that the vendor claims is more efficient than both ETC and MNP-10. It was also unavailable for testing, but should be available by the time you read this.

The PC Card is very easy to set up and configure. Establish service from your local cellular-service provider, then simply plug the PC Card into the PCMCIA slot, connect the cradle, and slide the phone into the cradle. The last step is to run the setup software, which is very intuitive and easy to use.

We tested the PC Card with a Toshiba T1950CT laptop to determine its effectiveness in both stationary and mobile situations. We used Lotus' cc:Mail Remote to check LAN-based mail, Traveling Software's CommWorks for both MCI Mail access and faxing, and WinCIM for CompuServe connectivity. During the stationary tests, we successfully accessed cc:Mail and MCI, and sent and received faxes without a hitch. We were able to establish a connection to CompuServe on most of our attempts, but lost each con-

nection shortly thereafter due to prolonged periods spent waiting for data to traverse the cellular connection, despite a timeout setting of 2 minutes.

The mobile tests, conducted on a commuter train, proved the PC Card's limitations: Our cc:Mail and fax connections were still successful, but we were unable to connect to MCI or CompuServe despite repeated attempts.

Compared with the wireless modems that are currently available, the PC Card is a good solution for taking your data on the road. However, it is not intended to replace land-line modems, and its inability to connect reliably to services like CompuServe and MCI is a sign of the immaturity of wireless technology in general. Those users waiting to toss their wired modems out the window will have to wait a while longer.

• List price: *Nokia PC Card*, \$699.
Nokia Mobile Phones Inc., 2300 Tall Pines Dr., #120, Largo, FL 34649-2930; 813-536-5553; fax, 813-530-3599.

Circle 964 on reader service card

KING AMONG PEERS

POWERLan 3.0: The Most POWERful Peer-to-Peer LAN Operating System

Click a mouse four times and key in your name. That's all it takes to install POWERLan. But the sleek, animated interface is just the beginning.

Grows with You

Comfortably add users while you mix and match Windows and DOS. As you grow, enjoy true peer-to-peer and client/server flexibility in any combination.

Strongest Peer Platform

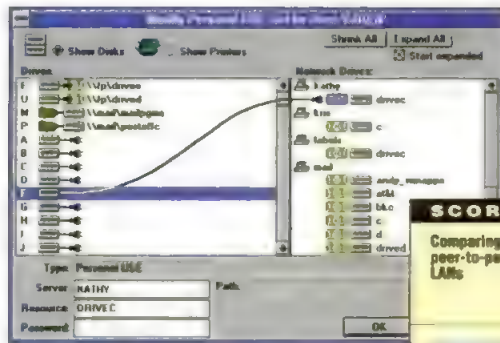
POWERLan's multi-tasking, dedicated server provides the capacity and horsepower for your performance-critical applications.

Designed to Standards

Built to Microsoft/IBM standards, POWERLan speaks the same protocols as networks such as WFW, NT, and IBM LAN Server—complementing these environments where needed.

Incredibly Easy to Manage

Superior user and group handling, single-logout to the entire network, remote admin, and mainframe-style printing—all contribute to POWERLan's easy setup and administration for small or large sites.



Now connecting resources is plug and play—literally!

"POWERLan's combination of ease of use, solid performance, and strong management features will appeal to many small to medium-sized sites looking to connect their stand-alone computers."

PC Week
February 7, 1994



800-443-LANS

Performance Technology
800 Lincoln Center
7800 IH-10 West
San Antonio, Texas 78230

PERFORMANCE TECHNOLOGY



SONY

NEW DDS-2 NOW TWICE THE THOUGHT GOES INTO IT.

From the innovators at Sony comes DDS-2, the next generation of 4mm tape technology. With double the storage capacity of your current DDS, DDS-2 can hold 4GB of data, up to 8GB with compression. With a thirty-year archival life and a thousand full backups per cartridge, your files are entrusted to tape manufactured by the same company that continually sets new standards in all products. We put our best thinking into them. Now it's your turn. Call 201-476-8199.

©Sony Electronics Inc. Reproduction in whole or in part without written permission is prohibited. All rights reserved. Sony is a trademark of Sony.

CIRCLE 885 ON READER SERVICE CARD.



► PC-TO-MAC CONNECTIVITY

Timbuktu: A Tale of Two Platforms

BY O. RYAN TABIBIAN

Collaborating on a newsletter is a great idea as long as the group of people involved isn't a mixed bag of PC and Mac users. Throw the two platforms together and you'll have to overcome incompatible file systems and disk formats. You can use some powerful network operating system such as NetWare to solve this problem, but for a small workgroup you might not want to bother with such an expensive solution. Timbuktu for Windows, Farallon's new connectivity software, uses an AppleTalk network to let PCs and Macs transfer files and control each other remotely: One Timbuktu client can assume direct control of others on the network. However, the remote-control functions are limited to local connections. Timbuktu is also a useful tool for network troubleshooting, but be careful: It might be incompatible with your existing LAN.

Farallon is only one of many companies that offer products for integrating PCs and Macs. Novell's NetWare for Macintosh allows Macs to become clients in PC-centric NetWare networks, and Artisoft offers two products (LANtastic for Macintosh and LANtastic for Macintosh Windows Gate-way) that allow a PC to act as a gateway between Mac and PC networks.

Timbuktu for Windows' remote-control capability is an excellent tool for network managers who need to keep an eye on both PCs and Macs. Using Timbuktu, you can take control of any PC or Mac running Timbuktu on the network and either reboot or troubleshoot problematic clients. Unfortunately, Timbuktu for Windows' remote-control feature is limited to direct LAN connections.

The latest Mac version of the product, Timbuktu Pro, provides remote control via modem connections (dial-in remote control) using Apple Remote Access (ARA) software. Timbuktu for Windows is essentially a PC port of the Macintosh software, but it offers fewer features.

Another Timbuktu Pro feature not included in the PC version is IP support. Through IP and dial-in remote control, Timbuktu Pro users can take over almost any other Mac running Timbuktu Pro on the Internet.

Timbuktu for Windows does provide a user-friendly interface that makes it very easy to set up and configure. This is especially important since Farallon markets the product primarily for Mac users who may be unfamiliar with DOS and Windows commands.

Despite the user-friendly interface, however, we did run into some technical problems during installation. To begin

with, we were unable to load both NetWare 3.12's Virtual Loadable Module (VLM) client drivers and the AppleShare stack on our clients. We solved the problem by upgrading the VLM we were using from Version 1.02 to 1.1.

After fixing the VLM problem, we tried running Timbuktu for Windows on a PC connected to a LAN. Unfortunately, only then did we find that its AppleTalk stack could not be loaded alongside a NetBIOS stack. NetBIOS is the protocol used when running most peer-to-peer LANs, not to mention Microsoft LAN Manager, IBM LAN Server, and powerful applications such as Lotus Notes. Farallon acknowledges the incompatibility and is working on a solution. In the meantime, however, the company recommends that Timbuktu for Windows not be used on NetBIOS LANs.

Finally, you'll also want to be careful with your client memory. Since Timbuktu loads another protocol stack into memory, you might quickly find that you'll tie up too much of DOS' 640K of conventional memory. This is particularly true in those rare cases where you might want to

run Timbuktu for Windows on NetWare clients that are configured with the TCP/IP protocol set. With IPX, AppleTalk, and TCP/IP loaded, we were left with only 400K of conventional memory—not even enough to run most DOS applications (not to mention Windows applications).

Timbuktu for Windows' file transfer and remote-control features are very powerful and easy to use. But you may find yourself frustrated by its in-compatibility with NetBIOS and to a lesser extent by its lack of IP support and dial-in remote control.

• List price: *Timbuktu for Windows*, \$199. Farallon Computing Inc., 2470 Mariner Square Loop, Alameda, CA 94501-1000; 800-998-7760; fax, 510-814-5020.

Circle 961 on reader service card

■ Novell Offers Equal Access

By O. Ryan Tabibian and Michael Ryan

The general rule for current PC-to-Mac connectivity solutions is that Macs are treated as a step below their Intel-based cousins. Rather than granting each platform equal status, PC-to-Mac products typically set up a gateway between the two environments merely so that either PCs can access AppleTalk printers or a Mac workgroup can be set up within a PC environment: Mac users do not gain full access to the PC network. Timbuktu is a minor exception to the rule because it is really designed to incorporate PC workgroups within Mac environments (rather than the other

way around).

The next version of Novell's NetWare for Macintosh, on the other hand, will be a major exception to the rule. It will use a Mac version of IPX instead of AppleTalk on Mac clients to make it possible for PCs and Macs to exist as equals on the network: Macs will gain full access to Novell's NetWare Directory Services in NetWare 4.x environments. This represents a giant step forward in PC-to-Mac integration. In fact, it should make coexistence between PCs and Macs a way of life rather than a whimsical fantasy.

The secrets out



The 18-ppm Ecosys FS-3500A Cartridge-Free printer can cut costs by 66%.

The real savings just begin with Energy Star

When you invest in Energy Star compliant printers your costs will go down. It's that simple.

Or is it? The fact is you can cut costs much more by switching to Ecosys® Cartridge-Free page printers from Kyocera®

True economy.

Ecosys printers are Energy Star compliant but better yet, they feature permanent, self-cleaning image drums. That means Ecosys printers eliminate replaceable cartridges required by traditional printing technology and slash your consumables budget by as much as 66%.* That's because the simple,

no-mess \$49 Ecotone® toner refill yields 7,000 pages at 5% coverage, to print at 0.7¢ per page.

Meanwhile, the \$169 HP® cartridge (to take an example) prints 8,000 pages for a cost per page of 2.1¢ – three times the price of Ecosys output.* In just one year, a single Ecosys printer can pay for itself in savings. Network savings can add up to hundreds of thousands of dollars a year.

Do the math, or call for a demo.

Prove it to yourself. To figure your savings, divide your cartridge price by its yield

at 5% coverage (the industry standard) for cost per page. Multiply this number by your annual page volume. Repeat with 0.7¢ per page for Ecosys, and take the difference.

Or call 1-800-2-ECOSYS for a free demo diskette that runs the calculation with your numbers. You'll also get more information about how Ecosys technology saves money and the environment.

There are a lot of Energy Star-compliant printers in the universe, but only one technology that goes beyond. Ecosys.
1-800-2-ECOSYS



CIRCLE 869 ON READER SERVICE CARD

*Calculation based on per-page costs of printing derived from cartridge list prices as of 8/93; yields at 5% page coverage from manufacturer's specifications; network printing volume standards as defined by InfoCorp. Prices and specifications subject to change. Please call or write for more information. The Energy Star emblem does not represent EPA endorsement of any product or service. ©1994 Kyocera Electronics, Inc. Kyocera is a registered trademark of Kyocera Corporation. Ecosys and Ecotone are registered trademarks of Kyocera Electronics, Inc. HP is a registered trademark of Hewlett-Packard Company.

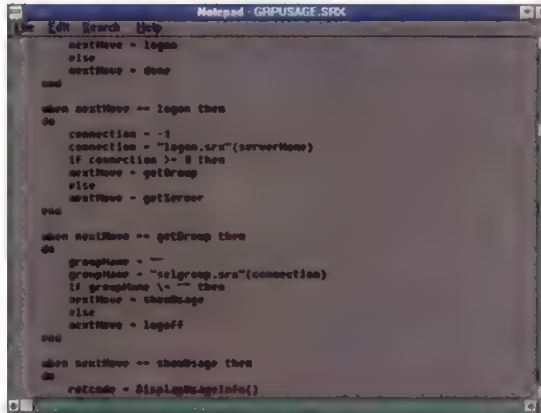
► NETWORK ADMINISTRATION

More Power to You from Simware

BY STEVE RIGNEY

The modules you use for the care and feeding of your NetWare LAN can clog up your server unless you remove them promptly when they finish their tasks. Simware's REXXware scripting utility lets you automate loading and unloading them as well as automate other tasks. And while you might find REXXware's scripting language more difficult to learn than BASIC, which most other network scripting utilities use, the time it takes would be well spent because REXXware can turn you into a more efficient network manager.

Unlike other network scripting utilities, REXXware is based on the Restructured Extended Executor (REXX), a powerful structured programming language that was originally deployed on IBM mainframes and is currently used as



ACCORDING TO THE SCRIPT: Using REXXware, you can write structured scripts to automate multiple network tasks.

OS/2's macro language. REXX is more powerful than BASIC and contains more commands. By way of contrast, the latest release of NLMerlin, Knozall Systems'

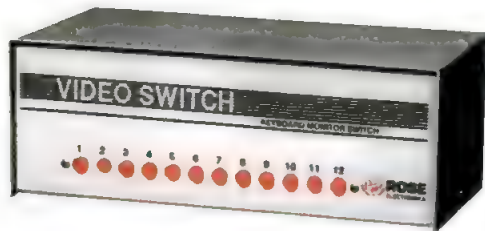
network administration and scripting utility, uses a language that is similar to BASIC, but Knozall plans to include REXX support in its next release. (For more information, see "Knozall's NL-

Merlin Can Be a NetWare Administrator's Best Friend," December 21, 1993).

REXXware provides control of NetWare tasks and functions by using Novell's CLIB, a library of the functions required for NLMs to operate. REXXware uses information from the CLIB to provide access not only to NetWare bindery information, but a host of other data, including Btrieve statistics and the Transition Tracking System, which is used by NetWare 3.x to keep records of every file and print transaction. For example, you could create a script that lists all groups on the network that do not have supervisory rights and use more than 80MB of disk space. Using the NetWare Syscon utility,

Your Choice of Keyboard Monitor Switches

Access multiple computers with a single keyboard and monitor to cut equipment costs, save valuable space, and end clutter



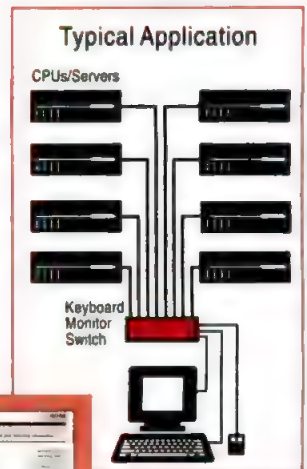
Manually controlled unit

- Simple pushbutton operation for quick selection
- Four, eight, or twelve ports per unit
- Daisy-chaining connects unlimited number of CPUs
- Compatible with EGA, VGA, Macintosh, Sun, and others
- Optional keyboard booting for 286, 386, and 486
- Optional RS232 or PS/2 mouse interface
- PCB construction for high reliability and low crosstalk
- Rack mount, matrix, and customized units available

- Switch by keystroke, from front panel, or RS232 port
- Two or four ports per unit
- Cascade units to support up to 255 CPUs
- Supports monochrome, EGA, and VGA
- Includes keyboard booting for 286, 386, and 486
- Includes RS232 and PS/2 mouse interface
- LEDs display selected CPU and CPU power-on
- Scan function switches among CPUs automatically



Keyboard controlled unit



Call toll-free now for your copy of our Switching and Sharing Solutions catalog.

Other Rose products. Print servers, printer sharing units, print buffers, keyboard monitor extenders, video splitters. All Rose products are US-made and have a 1-year warranty.

Make the Rose Connection

10850 Wilcrest Drive • Houston, Texas 77099 • Phone (713) 933-7673 • Fax (713) 933-0044

ROSE
ELECTRONICS

1-800-333-9343

HASSLE FREE

TOKEN-RING PCMCIA AND POCKET ADAPTERS

If you've been hearing about installation hassles when it comes to portable Token-Ring adapters, then it's time you heard about Olicom. Thanks to our superb installation support, our PCMCIA and Pocket Adapters are about as near to plug-and-play as you can get.

They're packed with power, too. In fact, coupled with our high-performance PowerMAC drivers, they're about the fastest portable adapters around. And if you don't have an Olicom adapter in your PC back at work, you might just discover that the computer on your lap works faster than the one on your desk!

Like all Olicom products, our portable adapters are 100% IBM compatible and interoperable, and support all major network operating systems.

In short, if you're wondering how they crammed so many problems into such a small adapter, you've made an installation error.

You should have installed Olicom.

olicom 
TOKEN-RING SOLUTIONS

Olicom USA, Inc. • 900 East Park Boulevard, Suite 180 • Plano, Texas 75074 • Tel: (214) 423-7560 • Fax: (214) 423-7261

IBM is a registered trademark of International Business Machines Corporation

CIRCLE 853 ON READER SERVICE CARD



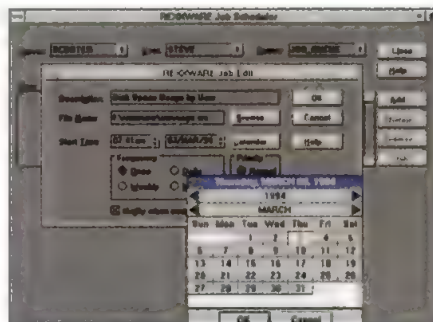
the same task could take several hours, depending on the size of your LAN. NLMerlin does not interact with the CLIB and relies solely on the bindery for information.

To facilitate the scheduling of jobs, REXXware includes a Windows-based scheduler with which you can easily automate the launching of reports and applications. Scripts are placed into a job queue and can be scheduled according to time of day or other criteria, such as the amount of disk space on a certain drive. Using the scheduler, we ran a script that launched our network backup utility at midnight then unloaded the NLMs at 4:00 A.M. when the backup was completed.

The REXX programming language is fairly easy to learn, though you will probably find it more difficult to learn than BASIC. Simware includes several detailed manuals to help get you started, but as is the case with most programming languages, the manuals are more helpful as reference on the various REXX commands and structures than as learning

guides. To help flatten the learning curve, you might want to pick up a third-party tutorial book on REXX.

REXXware does include 30 sample



ON QUEUE: REXXware jobs can be scheduled by time of day or various network statistics.

scripts, which can be even more important than a tutorial. The samples include scripts for automatically loading and unloading NLMs, scheduling system backups, and generating detailed reports on the status of your network. Both programs allow you to run scripts to control multiple file servers from a central PC or

NetWare system console. Unlike NLMerlin, REXXware does not utilize client agents, which allow you to automate tasks on individual clients.

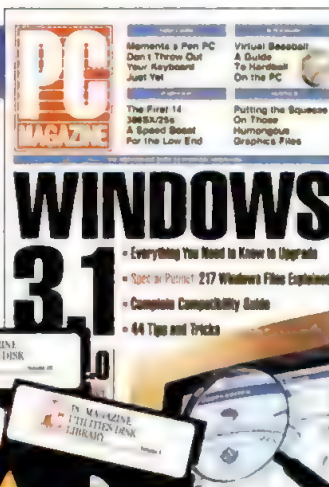
REXXware does not include a script editor, but REXX scripts are written in ASCII format, so you can use the DOS Edit program or your favorite word processor to write and edit your scripts. NLMerlin provides a Windows-based script editor, which is more convenient. Neither REXXware nor NLMerlin offers a report editor. Instead, both products generate reports in ASCII format for viewing through a word processor.

REXXware is a good utility for automating network tasks. It cannot automate tasks at the client level and uses a language that can be a bit more difficult to learn than NLMerlin's BASIC, but it is a more powerful utility overall.

• List price: REXXware, \$695 (two servers); \$1,495 (six servers). Simware Inc., 2 Gurdwara Rd., Ottawa, Ontario, Canada K2E 1A2; 613-727-1779. Circle 965 on reader service card

**GET NONSTOP
SYSTEMS
INFORMATION...**

**AND 3
DISKS -
FREE!**



FREE!

**Call toll-free today:
1-800-289-0429**

Basic one-year subscription \$44.97; on newsstands \$64.90. Canada and foreign add \$32.00 per year. U.S. funds only. Canadian GST included. Please allow 30 days for shipment of first issue. FREE disks will be sent upon payment.

Subscribe to PC Magazine today. You'll get 22 issues for only \$29.97 — that's 54% off the \$64.90 cover price! Better yet, sign up for two years and get 44 issues for just \$49.97 — a savings of 62%!

Order now and you'll also get **PC Magazine's "Utilities Disk Library" on 3 disks — FREE** with your paid subscription! These 103 utilities, selected especially for new subscribers by the editors of PC Magazine, let you upgrade your system, boost your PC power, and simplify tasks — all at just the touch of a key!

ONE YEAR

(22 issues) for \$29.97.
YOU SAVE 54%!

TWO YEARS

(44 issues) for \$49.97.
YOU SAVE 62%!

The only network management solution for people who won't take no for an answer.

	SABER LAN WORKSTATION	SYMANTEC NORTON ADMINISTRATOR	INTEL LANDESK MANAGER
DOS & Windows Menus	Yes	No	No
Application Metering	Yes	Yes	Yes
File & Software Distribution	Yes	Yes	No
Hardware Inventory	Yes	Yes	Yes
Software Inventory	Yes	Yes	Yes
.INI File Management	Yes	No	No
Printer Management	Yes	No	Yes
Disk Monitoring	Yes	No	Yes
Alarm Notification	Yes	No	Yes
Scripting Language	Yes	Yes	No

Look closely at the leading network management solutions and one thing's perfectly clear.

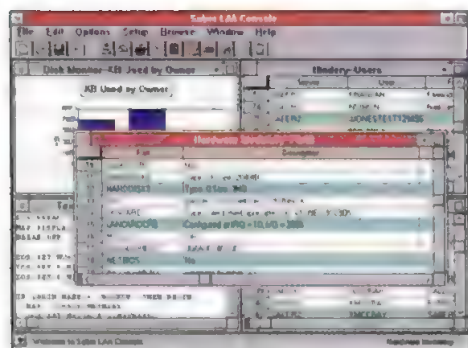
There's really no comparison. Saber LAN

Workstation 2.0 offers more product features,

more ease of use, more flexibility and versatility than the others.

But, of course, that should come as no surprise. Saber

was the first to offer LAN administrators an integrated view of their network. And we continually set new standards for the industry.



Saber LAN Workstation 2.0 is the one product, the one interface you need for all essential network jobs.

Saber LAN Workstation is the most cost-efficient, comprehensive network management solution ever offered in one package. One that serves both the front end and the back end of your network. At a price less than others routinely charge for just one piece. And since Saber offers education, consulting, and free CNE-trained technical support, you can be sure that, to us, you're not just a customer, you're a partner.

So if you're looking for a network management solution, don't take no for an answer. Say yes to Saber LAN Workstation 2.0.

Compare for yourself. Call today for a free Demo Disk of Saber LAN Workstation.
800 977-2237 ext. 41



Visit us at Networks Expo, Booth #326

To order or for the reseller nearest you, call 800 977-2237.

Saber LAN Workstation is compatible with Novell NetWare, Microsoft LAN Manager, Banyan Vines, DEC PathWORKS, IBM LAN Server, Artisoft LANtastic, MS-NET based-networks and Windows for Workgroups. Saber Software Corporation 5944 Luther Lane Suite 1007 Dallas, Texas 75225 214-361-8086 FAX 214-361-1882
Copyright © 1994 Saber Software Corporation. Saber Software Corporation is not affiliated with American Airlines, Inc. or its SABRE Travel Information Network. All trademarks acknowledged.
CIRCLE 856 ON READER SERVICE CARD

► INTEGRATED HUB / ROUTER

Cayman Blends Economy and Flexibility

BY JEFFREY D. BAHER

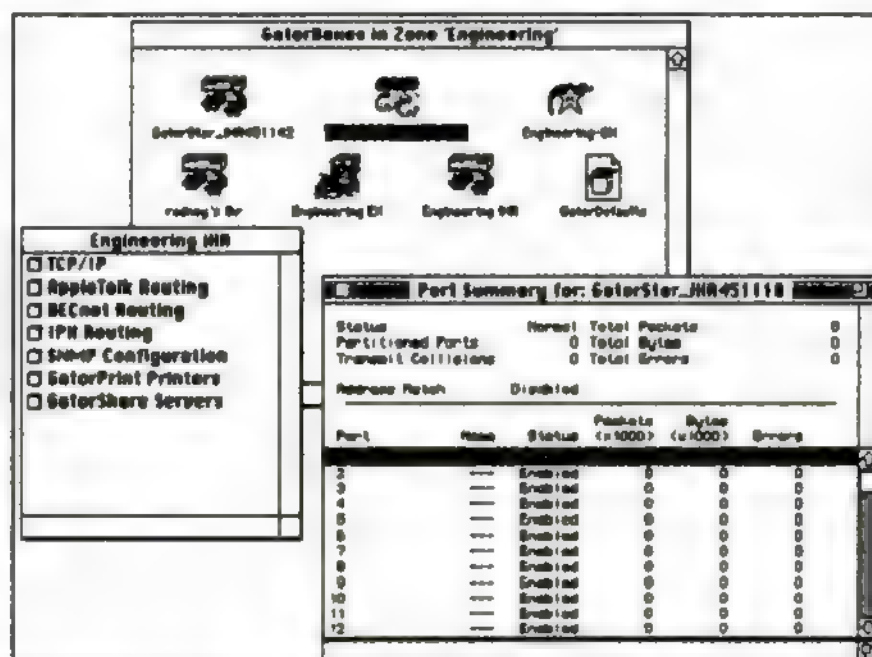
Why spend time and money installing a separate hub and router when you can get both in a single unit? Cayman's GatorStar iHR Ethernet workgroup hub provides built-in multiprotocol routing as well as two expansion slots for upgrades in one moderately priced device. The \$4,995 hub is flexible, expandable, and SNMP-manageable, and it may just establish a new high end in the low-end hub market.

The GatorStar iHR 24-port hub's built-in routing and expansion slots will support Cayman's forthcoming LocalTalk and WAN connection modules. Additionally, the iHR offers twisted-pair and coaxial connections to an Ethernet backbone. The iHR is easy to set up and can be managed remotely through a TELNET session or locally through a direct serial connection, an SNMP management station, or Cayman's GatorKeeper software (included with the iHR), which is only available for the Mac.

Cabletron's MicroMMAC-24E (\$5,495) is the iHR's closest competitor. Like the iHR, the MicroMMAC is a 24-port Ethernet hub with multiprotocol routing support, which can be added through a Bridge-Router Interface Module (BRIM). There are currently two types of BRIMs available for this hub: one for routing between Ethernet segments and one for WAN connections of up to T1 speed (1.544 Mbps). Unlike the iHR, the MicroMMAC does not include routing with the price of the hub: Its Ethernet BRIM is \$1,995, and its WAN BRIM is \$1,495.

The MicroMMAC is already more expensive than the iHR, and the additional cost of the BRIMs makes the iHR all the more attractive. The iHR also supports routing among up to four segments, while the MicroMMAC routes between two.

The Gator Star iHR's routing is provided by the built-in Gator System software, which supports AppleTalk, IPX, IP, and DECnet protocols. The software can be used to filter out unnecessary traffic on the link between segments, such as the Service Advertising Protocol (SAP) broadcasts, which are issued by NetWare



MAC MANAGEMENT: Cayman's GatorKeeper software is a Macintosh application.

servers to make their presence known on the network and can tie up inter-LAN connections.

The iHR also supports MacIP, a protocol that allows a Macintosh to communicate with a TCP/IP network using AppleTalk. It works by encapsulating outgoing IP packets within AppleTalk Datagram Delivery Protocol (DDP) packets. When the iHR receives the packet, the AppleTalk portion is stripped off and the IP part is forwarded to its destination.

The iHR's two expansion slots will be able to house Cayman's forthcoming LocalTalk and WAN connectivity modules to enhance the hub's already impressive internetworking capabilities. The LocalTalk module, which should be available by the time you read this, will extend connectivity and routing support to LocalTalk segments, allowing you to integrate the lower-speed Macintosh segments into your PC-based Ethernet LAN. Cayman will deliver two WAN modules that will allow the iHR to connect to

remote networks and resources via asynchronous lines at 19.2 Kbps or synchronous lines for higher-speed Switched 56 services.

CONFIGURATION AND MANAGEMENT

Once the hub is plugged in and the network connections are established, Cayman's GatorKeeper software makes configuration and management of the hub a breeze. The software is very easy to use and provides a GUI through which you can assign and configure the 24 Ethernet ports and check their status. The GUI also simplifies the often time-consuming process of router configuration: Instead of fumbling with the command-line interface to enter network addresses, you can use GatorKeeper's point-and-click GUI and pull-down menus. The only drawback to GatorKeeper is that it only runs on the Mac, and most networks are managed from PCs or Unix workstations. This isn't a major drawback, however, because you can also manage the iHR through HP OpenView and other SNMP platforms.

The GatorStar iHR can also be managed via either a direct serial connection between a PC (or Macintosh) and the hub or a TELNET session in which the network administrator dials in from a remote location using terminal-emulation software. Both utilize a command-line interface, however, which can be more cryptic than GatorKeeper and most SNMP platforms.

Security is provided via password protection and Cayman's PortSentinel feature, which prevents unauthorized network connections: the media-access control (MAC) address of each node connected to the iHR is assigned to a specific port, so new devices cannot connect until their MAC addresses are verified.

All things considered, the GatorStar iHR is a bargain. Its built-in routing and strong manageability place it at the forefront of the low-end hub pack, and its expandability could establish it as a leader.

• List price: *Cayman GatorStar iHR*, \$4,995. Cayman Systems Inc., 400 Unicorn Park Dr., Woburn, MA; 617-932-1100; fax, 617-932-0853.

Circle 963 on reader service card



DigiBoard Is Your Best Connection To Remote LANs.

DigiBoard brings remote LANs closer together.

Whether you have an outside salesforce that needs access to data, road-bound executives that need their E-MAIL, or satellite offices that need to communicate on a regular basis, DigiBoard can help you make the connection. Anywhere in the corporate network. Anywhere in the world.

Wherever There's a Phone Line... You Can Extend Your LAN.

DigiBoard remote communication products install easily and provide high-speed connectivity through standard or digital (ISDN) phone lines. In fact, you can choose from a wide variety of products and connect over 1000 users through a single server without degrading performance. With DigiBoard, anywhere there's a phone line you can extend the corporate LAN.

DigiBoard Makes Your World a Little Smaller and a Lot More Profitable.

As your world gets smaller, DigiBoard's intelligent serial boards can help make it more profitable. With an onboard front-end processor, these boards off-load processing requirements from your host CPU. This keeps host

performance high while eliminating data loss caused by host interrupts. And our unique architecture provides transmission speeds faster than standard serial ports. This reduces transmission time and lowers phone bills. All of which keeps performance high, overhead low, and saves you time and money.



High Speed Ports for Remote Access

DigiBoard provides a range of connectivity solutions from adding a single user to creating a corporate communications hub. Choose from intelligent serial ports (asynchronous for standard or synchronous for X.25 communications) and ISDN products.

Here's How You Make the Right Connection.

Just call DigiBoard for a FREE pocket guide. Ask for either The Pocket Guide to Extended LAN Access Solutions or The Pocket Guide to ISDN LAN Extensions. Or talk to a product specialist for additional information.



Call 1-800-551-4797

DigiBoard

The Smartest Connection You Can Make

DigiBoard U.S.A. (800) 344-4273 • (612) 943-9020 • FAX (612) 943-5398 • European Office TEL +49 (0) 221 92052 0 • FAX +49 (0) 221 92052 10 • E-MAIL usenet@digidbinfo or info@digidb.com

© 1993 Digi International Inc. All rights reserved. All brand names and product names are trademarks or registered trademarks of their respective holders.

CIRCLE 854 ON READER SERVICE CARD



For the perfect
backup solution...

Chances are you're already familiar with Maynard/MaynStream tape backup solutions. And you know the quality and reliability that comes with that name. So take note. Now you'll find the entire line of superior Maynard/MaynStream products under another innovative name in storage—the Conner MS Series.

Conner's MS Series offers the same comprehensive features as MaynStream. And as always, each system is tested, certified, and designed to work as a complete, integrated tape backup solution. With capacities ranging from 525 MB to 20 GB on a single tape. In formats including quarter-inch cartridge (QIC), digital audio



Which names
do you want
behind you?

tape (DAT), 8mm and digital linear tape (DLT). What's more, the Conner MS Series offers data protection for every conceivable type of network—OS/2, DOS, Macintosh and Windows workstations, as well as LAN Manager and NetWare servers. With feature-rich Conner Backup Exec software for DOS, Windows, and Novell NetWare

Maynard/Maynstream
is now the
Conner
MS Series.



Loadable
Module
(NLM),
depending
on your

needs. So call 1-800-755-0535 today to find out more about your favorite backup solutions. But remember, ask for them by their new name—the Conner MS Series.

CONNER
Storage Systems

MS-FCM

Novell, NetWare and the YES icon are trademarks of Novell. Developer tested only. Novell makes no warranties with respect to this product. Conner Storage Systems, Lake Mary, FL (407) 263-3500. ©1994 Conner Peripherals, Inc. All trademarks or registered trademarks are of their respective owners.

CIRCLE 948 ON READER SERVICE CARD

NEW & IMPROVED

NEWS OF ANNOUNCED NETWORK PRODUCTS AND UPGRADES

by Vicki B. Jacobson

NEW

CiscoFusion Blends ATM, Routing, and Switching

Cisco Systems, the leader in routers, announced a suite of products that will allow users to migrate from Ethernet to the high-speed transport of tomorrow, ATM. The products are based on CiscoFusion, Cisco's new internetwork switching architecture. CiscoFusion combines emerging switching technologies, including ATM, LAN switches, and virtual LANs.

This technology uses ATM as its core engine to switch at layers 2 (the Data Link layer) and 3 (the Network layer) of the Open Systems Interconnection (OSI) model. CiscoFusion, like other switching technologies, provides users with additional bandwidth while shifting them into high-speed networking. And Cisco also combines management capabilities to accommodate network changes and disruptions.

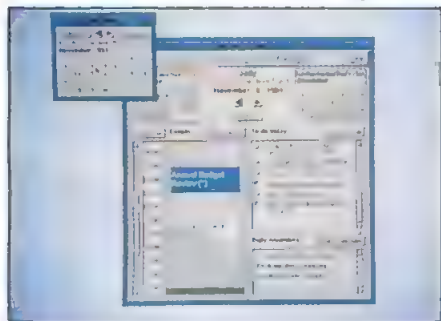
Cisco will begin implementing the CiscoFusion architecture in its Cisco 7010 router. The new router will support up to 18 LAN or 24 WAN interfaces. An ATM interface will be available in the middle of 1994. Cisco is also releasing a workgroup switch, Catalyst, which will be the first product to come out of Cisco's acquisition of FDDI-over-copper (CDDI) leader, Crescendo Communications. Catalyst dedicates a separate Ethernet LAN to each client, and it provides the client with 100-Mbps access to the server through a CDDI or FDDI ring.

• List price: *Cisco 7010*, \$11,900; *Catalyst*, \$9,600. *Cisco Systems Inc.*, P.O. Box 3075, 1525 O'Brien Dr., Menlo Park, CA 94026; 415-326-1941.

Circle 952 on reader service card

IMPROVED

CrossWind and the Single User



GETTING IT TOGETHER: Scheduling tools for personal and enterprise-wide use.

Like ON Technology Corp., CrossWind brings a client/server scheduling application to a multitude of users, in this case both Windows and the higher-end Unix environments.

• List price: *Synchronize, Version 1.3*, \$100 per user. *CrossWind Technologies Inc.*, 6630 Highway 9, #201, Felton, CA 95018; 408-335-4988; fax, 408-335-1086.

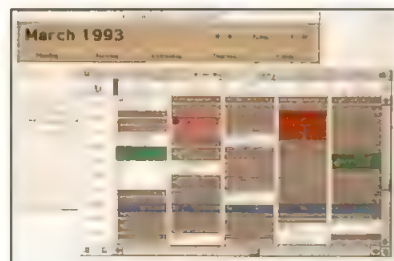
Circle 953 on reader service card

Previous versions of **CrossWind Technologies'** *Synchronize* concentrated on the needs of an enterprise-wide organization. Its latest release, Version 1.3, re-examines the needs of the individual.

Version 1.3 includes new features that allow users to customize their environment. Users can now assign color-coded, user-defined categories to their meetings, appointments, and tasks. *Synchronize* also offers users private and group daily, weekly, and monthly views. Other features include personal and shared address books and hierarchical permissions.

HOT PROSPECT

I'll Have My Book Call Your Book



New to the world of client/server scheduling is **ON Technology Corp.'s** *Meeting Maker XP*. It helps groups organize their collective (and individual) lives. The scheduler (\$75 to \$79 per user) works across DOS, Windows, and Mac platforms and NetWare, AppleTalk, and LANtastic LANs to help coordinate appointments and meetings. It also supports more platforms and is less expensive than CrossWind's *Synchronize*.

Meeting Maker features a click-and-drag GUI for Windows and Mac users and a DOS client for DOS machines. The software also features a personal calendar for individual appointments, daily views, and reminders for meetings and activities. The auto-pick features take the tediousness out of group scheduling; they find the first available time for all attendees. And, if you're not around, the proxy feature allows other people to act on your behalf.

• List price: *Meeting Maker XP*, \$790 (10-user); \$3,750 (50-user). *ON Technology Corp.*, One Cambridge Center, Cambridge, MA 02142; 800-548-8871.

Circle 951 on reader service card

NEW

Kalpana Gives a Boost to Ethernet Switching

Kalpana announced both a software and a software/hardware switching product, SwitchBalance and EtherChannel respectively. Both products promise to provide up to four additional 10- or 20-Mbps connections for eliminating Ethernet bottlenecks. Each one of them offers high-speed networking without the cost of moving to FDDI or ATM.

SwitchBalance is a NetWare Loadable Module (NLM) that operates between a NetWare server and Kalpana's 15-port EtherSwitch EPS-1500. The NLM distributes traffic (in half- or full-duplex mode) across the network adapters. SwitchBalance increases throughput by up to 80 Mbps. EtherChannel attacks the bottlenecks that can occur on the segments between two EtherSwitches. The firmware provides multiple connections between switches; up to six EtherSwitches can be connected for a total of 60 ports and 325 Mbps of throughput.

• List price: *SwitchBalance*, \$495; *EtherChannel*, \$75. *Kalpana Inc.*, 1154 E. Arques Ave., Sunnyvale, CA 94086-4602; 408-749-1600; fax, 408-749-1690.

Circle 956 on reader service card

IMPROVED

Video Servers Get Star Power

Coming soon to a PC near you—multimedia via the network. The question is, how will your networked PC accommodate these bandwidth-hungry video and audio applications? **Starlight Networks'** answer is the latest release of its StarWorks server software. Version 1.7 supports up to 40 DOS, Windows, and Macintosh users (compared with the current version's 20 users) who want to access bandwidth-intensive video and audio applications simultaneously on an Ethernet, Token-Ring, or FDDI network. This release provides up to 50 Mbps of continuous, high-quality video and audio throughput. It now supports over 100 gigabytes of audio and video file storage.

• List price: *StarWorks, Version 1.7*, \$24,995. *Starlight Networks Inc.*, 325 E. Middlefield Rd., Mountain View, CA 94043; 415-967-2774.

Circle 959 on reader service card

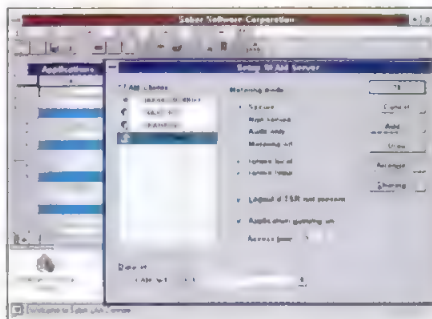
NEW

LAN Administration: Easy as it SEAMs

Network managers who need enterprise-wide metering and license management can use the new NetWare Loadable Module (NLM) from **Saber Software Corp.**, the Saber Enterprise Application Manager (SEAM). An add-on to the Saber LAN Workstation management utility, SEAM provides enterprise-wide metering and license management for DOS and Windows apps. Using Saber LAN Workstation's centralized console, the network manager can track, control, and report on application usage within the organization. The NLM can also cut application costs (and thereby overall network administration costs) by scanning the servers for available licenses and moving applications to the server that needs them.

• List price: *Saber Enterprise Application Manager*, \$695 per server. *Saber Software Corp.*, 5944 Luther Ln., #1007, Dallas, TX 75225; 800-338-8754.

Circle 958 on reader service card



METER MAID: SEAM lets users get control of their software assets.

BRIEFS

ROUTERS

Brixton Systems Inc. announced cost-effective software routers for connecting remote sites to a central office. Brixton's Internetworking Suite (\$495) software package is an alternative to the more costly hardware products typically used for setting up WAN connectivity. The suite, which includes BrxPPP, BrxFR, and BrxX25, connects users up over dial-up phone lines using the Point-to-Point Protocol, frame relay, or X.25, respectively. 617-661-6262.

Advanced Computer Communications'

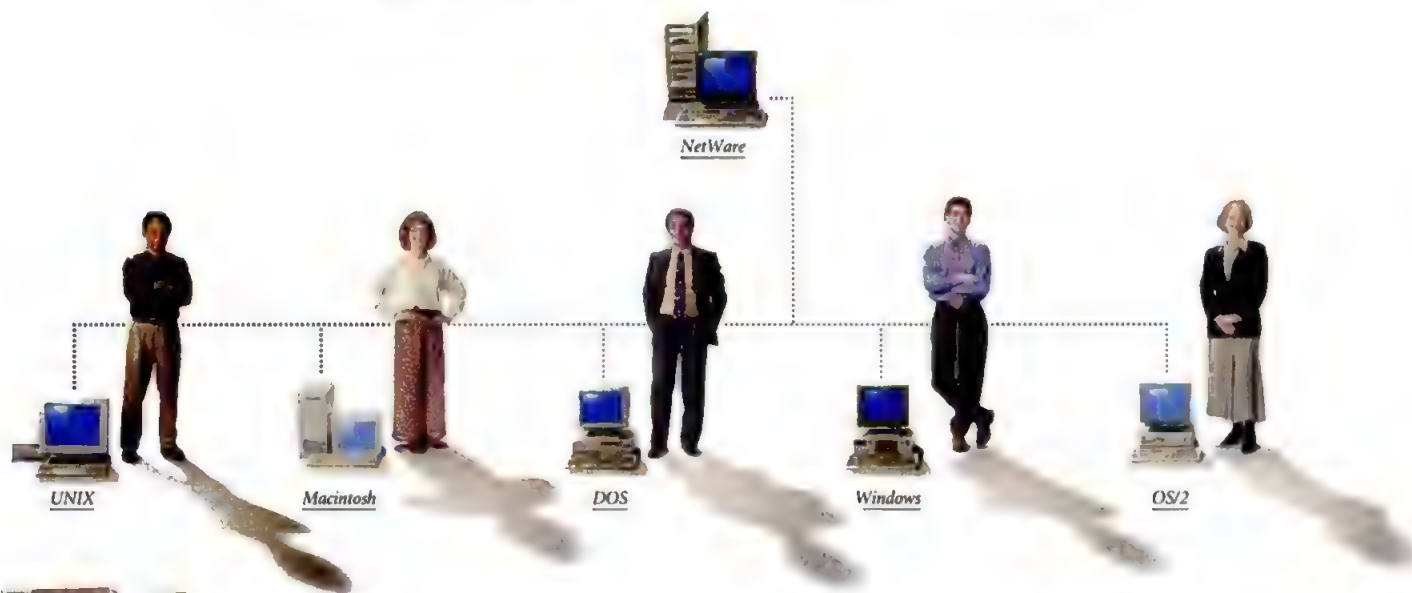
two-port bridge/router tackles bottlenecks caused by heavily loaded Ethernet networks. Tahoe (\$3,450 to \$3,950) operates as a self-learning bridge or a multiprotocol router. It can route TCP/IP, IPX, AppleTalk, DECnet, and Xerox Network Services. It can bridge DEC LAT, NetBIOS, NetBEUI, and VINES. 408-864-0600.

HUBS

Network Peripherals increases its stake in the fiber market with its new series of stackable Client/Server FDDI Hubs, available in three versions. Each is equipped with 14 ports and an SNMP agent. The NP-NFC-D11-300 (\$9,095) accepts unshielded twisted-pair (UTP) cable, the NP-NFC-D15-300 (\$10,495) features 2 fiber-optic ports and 12 UTP ports, and the NP-NFC-D55-300 (\$15,795) accepts fiber-optic cable. 800-674-8855.

Telebit Corp. is offering dial-up remote-office routing in a hub for as little as \$3,000. The company announced three new hubs: NetBlazer PN1 (\$3,399) includes one WAN port and an integrated V.32bis modem, PN2 (\$2,999) features two WAN ports, and PN4 (\$3,699) features four WAN ports. 508-441-2181.

NO MATTER WHICH PLATFORM YOU STAND BY, WE'LL BACK YOU UP.



Today's enterprise-wide networks are built on a range of platforms. Yet, when selecting software that backs them up, there's just one way to go: ARCserve from Cheyenne.

It's the industry's leading backup and restore solution for NetWare servers and clients running Windows, DOS, Macintosh, UNIX and OS/2, delivering fully automated data management for your entire enterprise. That's why ARCserve 5.0 was awarded LAN Magazine's 1994 Product of the Year for Network Backup Software. And why it's recognized by other major networking publications as the de facto standard for enterprise-wide backup. For more information, give us a call today. And find out why ARCserve is all the backup you'll ever need.



CHEYENNE
NEW YORK · PARIS · LONDON · MUNICH · TOKYO

CALL 1-800-243-9462 FOR A FREE COPY OF OUR ENTERPRISE BACKUP EVALUATION KIT.

© 1994 Cheyenne Software. All rights reserved. ARCserve is a registered trademark of Cheyenne Software, Inc. in the U.S.A. Other product names used herein are registered trademarks of their respective companies. *Outside of U.S.A. and Canada, call 1-516-484-5110

CIRCLE 868 ON READER SERVICE CARD

NEW

Interleaf Integrates All Things for All Users

Interleaf's new client/server document management application, **Intellecte**, combines the essential ingredients of document management in one package: automated work flow and configuration management, electronic document viewing and distribution, and automated document assembly. For easy access, **Intellecte** organizes the documents and places all of them in a central repository in their native format. When users (up to 124 Windows, Macintosh, or Unix) need them, they can point-and-click to search for, find, view, and edit documents.

• List price: *Intellecte*, \$175,000. *Interleaf Inc.*, Prospect Pl., 9 Hillside Ave., Waltham, MA 02154; 617-290-0710.

Circle 955 on reader service card

NEW

HP Stacks Up to the Competition

Stackable hubs offer a low entry point into the intelligent wiring hub market. **HP AdvanceStack**, **Hewlett-Packard's** latest stackable hub, is no exception, combining the benefits of stackable hubs (lower costs and flexibility) with the advantages of chassis hubs (manageability and usability). The hub comes with 12-, 24- or 48-ports; up to 16 can be chained together at distances of up to 185 meters via UTP cabling. Each hub is equipped with an expansion slot, allowing users to upgrade to **SNMP** management, advanced security features, bridging, and routing. **HP** also plans to accommodate remote monitoring (**RMON**) and high-speed backbone connections to **100VG-AnyLAN** (a 100-Mbps high-speed technology for both **Ethernet** and **Token-Ring**), **FDDI**, and **ATM**.

• List price: *AdvanceStack*, Model *J2600A* (12 ports), \$1,079; *AdvanceStack*, Model *J2601A* (24 ports), \$1,699; *AdvanceStack* *J2602A* (48 ports), \$2,899. *Hewlett-Packard Co.*, Direct Marketing Organization, P.O. Box 58059, MS511L-SJ, Santa Clara, CA 95051-8059; 800-533-1333.

Circle 954 on reader service card

NEW

Move Over, Green PCs

Hoping to be PC (politically correct), **Optiquest** introduced its new line of "green" **Optiquest** Uninterruptible Power Supply backup systems. The **Opti-UPS** system design features an internal battery for saving energy and protecting against power loss. The microprocessor-controlled unit features an LED display that lets users know when the battery is low, how the UPS is being used, and if a power surge occurs. If there is a complete power loss, the UPS feeds the computer system power from its own battery. The systems also perform a self-diagnosis when powered on.

• List price: *Opti-UPS*, \$249 to \$399; depending on the number of watts needed. *Optiquest Inc.*, 20490 E. Business Pkwy., Walnut, CA 91789; 909-468-3750.

Circle 957 on reader service card



ENERGY SAVER: Opti-UPS uses minimal power to protect from power outages.

BRIEFS

ADAPTERS

Apexx Technology Inc. provides an easy-to-use, fast, and cost-effective means of achieving PC-to-Macintosh connectivity: **PCTalk**. The **PCTalk** network adapter (\$199) snaps onto a computer's parallel port, providing an instant **LocalTalk** connection. The **PCTalk** adapter supports both **Farallon's** **Timbuktu** for Windows program and **PhoneNET** PC connectivity software. Using **LocalTalk**, PC users can connect to a Macintosh network or **PowerBook** or share any **AppleTalk**-compatible printer. 208-336-9400.

Boca Research Inc. continues to support the **VL-Bus** standard with the introduction of its new **10BaseT** adapter. The **BocaLANcard-VL** (\$119) is based on **AMD's** **PCnet-32** chip and provides support for most major network operating systems including **Novell's** **NetWare** and **Microsoft's** **Windows NT** and **Windows** for **Workgroups**. 407-997-6227.

TROUBLESHOOTING TOOLS

The AG Group wants to ease the burden of managing and maintaining a network. That's why it has upgraded its line of packet-level analysis software for **Ethernet**, **Token-Ring**, and **LocalTalk** networks. Version 2.04 of **EtherPeek** (\$795), **TokenPeek** (\$995), and **LocalPeek** (\$495) added support for **Server Message Block**, **NetBEUI**, **NetBIOS**, and **OSI** in addition to **IP**, **NetWare**, **VINES**, **DECnet**, and **AppleTalk**. 510-937-2479.

L-com Inc.'s new hand-held cable testing device goes to work on your **Ethernet** network for only \$79.95. The **DXB65** can test **10Base2** thin coaxial and also **10BaseT** UTP **Ethernet** cabling. 800-343-1455, 508-682-6936.



These Cards Will Get You In Anywhere... For Less

Introducing PCMCIA Ethernet adapter cards from Silicom Connectivity Solutions, the recognized innovator in low cost pocket LAN adapter technology. These PCMCIA Type II cards are the quickest and easiest way to connect your notebook to an Ethernet LAN.



Preconfigured Drivers

No need for configuring nightmares, our preconfigured software drivers support all network operating systems: Novell Netware, Microsoft LAN Manager, TCP/IP and more.

Hot Swapping

Insert or remove your Silicom PCMCIA Ethernet adapter card without shut down/reboot hassles.

Buy Direct & Save

Competitively priced with a 30-day money back guarantee and 2 year warranty—this may just be your lucky card.

Direct
Silicom
Connectivity Solutions

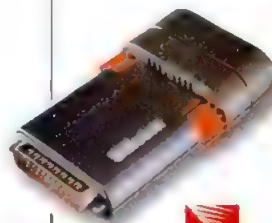
Call 800-4-SILICOM
800-474-5426

Three Cards To Choose From

- 10Base-T Unshielded Twisted-Pair\$159
- 10Base-2 Thin Coax\$169
- Combined Coax and UTP.....\$179

No Card Slot?

Plug-In With These Low Cost Self-Powering Pocket LAN Adapters



- | | |
|---------------------------------|-------|
| Ethernet | |
| Coax, Twisted-Pair or AUI | \$139 |
| Media Unit | \$25 |
| Token Ring | |
| Type 1 or Type 3 | \$279 |
| Media Unit | \$50 |
| ARCnet | |
| Coax or Twisted-Pair ... | \$119 |

Corporate purchase orders welcome. Pricing and specifications subject to change without notice. General Notice: Some of the product names herein have been used for identification purposes only and may be trademarks of their respective companies. Developer tested only. Novell makes no warranty with respect to this product. Silicom Connectivity Solutions, Inc. 16650 NE 79th Street Suite 101, Redmond, WA 98052 Tel: 206-882-7995 Fax: 206-882-4775



300,000 Network Product Buyers. Right Here!

In today's market, it's critical for you to reach network product buyers in the most efficient way.

With PC Magazine/*Network Edition*, your ad reaches 300,000 network product buyers. That's more network buyers than any LAN-specific publication reaches...by a LANslide.

With the largest full-time editorial staff of any LAN-specific publication, PC Magazine/*Network Edition* provides more of the kind of information that buyers want and need:

- More comparative evaluations
- More in-depth, comprehensive lab-based product reviews
- More network features examining network technology and implementation
- More reviews of how PC products operate in a networked environment
- More coverage on higher-end network products
- More "First Looks" lab-based reviews of just-released network products.
- More columns:
Frank Derfler and
David Greenfield
- More "New & Improved"

PC Magazine/*Network Edition* not only reaches the largest group of network product buyers, but it does so more efficiently than LAN-specific publications because buyers turn to it most often when purchasing products.

PC Magazine and
PC Magazine/*Network Edition*
Nothing Comes Close.



The Internet: Today's Information Highway?

I've spent my fair share of time with Internet junkies hearing all about how the Internet is tantamount to the information superhighway. They all point to the more than 25 million people worldwide who currently use the Internet. They all note the great services that are available on the Internet, not to mention the sense of community that often arises on-line.

But they rarely consider the technical, economic, or even user problems with the Internet; problems that involve not only the sheer amount of bandwidth that is required to support the information superhighway that users want, but also the necessary storage capacity and security. Because of these problems, while the Internet may be the data highway of choice today, it may never grow into the kind of thoroughfare needed to carry custom multimedia programs into millions of homes across the country.

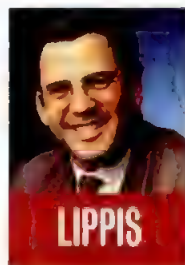
SERVICES FOR ALL

Now, I'm not saying the Internet won't draw users. It will and it does: A million new users a month, as a matter of fact. Right now, the single most important attribute of the Internet is the availability of a finite, but important, set of services: the ability to send and receive electronic mail, to access files on hundreds of thousands of computers, and to browse electronic bulletin boards. Also helpful are the recently introduced, easy-to-use navigational aids such as WAIS, Gopher, and Mosaic.

There are plenty of other compelling reasons to sign up for Internet access. The Internet remains the easiest and least expensive way to publish non-copyrighted information. Just compare its costs to buying a spot on radio or TV and you'll see what I mean.

And, if interactivity is the hallmark of tomorrow's superhighway, then you need look no further. Computing doesn't get much more interactive than it does on the Internet. (If anything, it's too interactive most of the time, demanding familiarity with complex Unix command structures.) The Internet has also created the culture for the superhighway. There are very few laws that govern the Internet, the main one being the authorized-use policy, which describes what type of traffic should be allowed and where it should be located on the Internet.

The problem with this and other laws is that there is little if any enforcement and no associated penalties for lack of compliance. Enforcement is self-policing; it's become part of the Internet culture and a community affair.



**The Internet
simply does not have
the bandwidth to support
video and other
real-time traffic.**

DON'T FORGET BUSINESS

There are also major technical weaknesses that the Internet community needs to explore and solve. Perhaps the biggest difficulty looming on the horizon has to do with bandwidth. The Internet simply does not have the bandwidth to support video and other real-time traffic.

Once you add video services, the millions of users who'll want to use the Internet will be faced with a rude awakening: Performance of the net will nose-dive.

Internet security is another big technical concern. Essentially, there is no security on the Internet. Intruders can snap up messages just by duplicating someone else's IP address. The lack of encryption exacerbates this, not to mention the scores of electronic viruses that come and go every so often, promising to erase hard disks and cause system crashes or, worse, intermittent file or data erasures. Firms are not replacing their private networks with the Internet because they simply don't

trust its security.

Then there's the matter of commercial advertising being taboo on the Internet; an obvious impediment to promoting on-line business development, which will be key to the information highway's success.

There clearly needs to be an advertising model for cyberspace. Without such a model, there will be little of the \$150 billion advertising industry knocking on Internet doors. Then, the problem would be that there is really no way to sell the space: You'd have to segment the millions of Internet users in the same way other markets such as radio, TV, news, and magazines, can. Without a way to segment these users, businesses can't buy and sell advertising.

Beyond these problems remains the fact that the Internet is notoriously difficult to use. It needs a new graphical user interface or paradigm so that users can navigate the network more easily. To date, there is no simple way to locate a resource; in other words, there's nothing even close to the equivalent of the yellow pages.

Can a nationwide network exist without meeting such basic requirements as sufficient bandwidth and security, an advertising model, and ease of use, among other things? Possibly. If we don't expect it to be a national entertainment network, the Internet will be the superhighway perhaps well into the 21st century.

NICK LIPPIS is a contributing editor of *PC Magazine* and is president of Strategic Networks Consulting, a consultancy specializing in enterprise networking. He is also publisher of *The Internetwork Advisor*, a monthly newsletter.

OVER 600 EXHIBITORS!
OVER 100 SEMINARS & TUTORIALS!
HUNDREDS OF LIVE TECHNOLOGY DEMOS!
OVER 65,000 OF THE INDUSTRY'S BEST AND
BRIGHTEST! ALL UNDER ONE ROOF.

COMING MAY 2-6, LAS VEGAS. PRE-REGISTER FREE! SAVE \$50!

THE NETWORKING EVENT OF THE YEAR IS HERE!



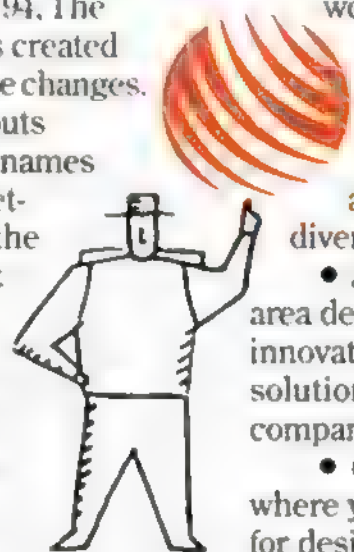
Announcing the most important networking and computing event ever held.

Networking changes minute-to-minute. LAN, WAN and telecommunications are converging into a single all-encompassing business environment—connecting not only desktop to desktop, but company to company.

NetWorld™+Interop® 94, The Networking Summit, was created specifically to mirror these changes.

This unique forum puts together the two biggest names in networking events. NetWorld™, the hallmark of the desktop LAN community. And Interop®, the proving ground of interoperability for the WAN and telecom worlds.

What you get is the first truly all-in-one networking forum.



The Summit for Networking Professionals.

NetWorld+Interop 94 is the gathering place for the industry's best and brightest. Only NetWorld+Interop 94 offers you this comprehensive educational experience free:

- *The InteropNet™*, featuring a guided tour of industry's only live multi-vendor, multi-protocol network that mirrors the interoperability challenges you face today.
- *Internet Showcase™*, where you can learn about the richness and diversity of the Internet.
- *Start-Up City™*, an exhibit area dedicated to showcasing innovative new products and solutions from emerging companies.
- *Configuration Clinic™*, where you can get suggestions for designing and configuring

your network from the best in the business.

- *CNEPA Labs*, a forum for the transfer of technical information from the vendors to the network computing professional.

- *TSA Net*, where Technical Service Alliance members join together to solve your biggest networking challenges right on-the-floor.

- *Solutions Showcase™ Demonstrations*, cooperative technology demonstrations by leading vendors including ATM, APPN, Fast Ethernet and Multimedia.

You will see the hottest new technologies demonstrated by more than 600 of the world's leading networking companies. You'll leave the show ready to make the best possible buying decisions for your company. Because when you see

it at NetWorld+Interop, you know it works!

Don't wait. Pre-register now and attend FREE!

NetWorld+Interop 94 Las Vegas takes place May 2-6, 1994 (exhibits open May 4-6) at the Las Vegas Convention Center.

For more information and details on how to attend FREE (a \$50 savings), or to become an exhibitor, call 1-800-488-2883 Extension 316.

Outside the U.S., call 415-578-6900, or contact us over the Internet at networld@interop.com.*

Don't miss this unparalleled chance to experience the best in networking.

*More information is available through Interop's Gopher Server at programs.interop.com and Web: www.interop.com



CIRCLE 101 ON READER SERVICE CARD

NetWorld+Interop 94 is produced by Interop Company. Interop is a registered trademark and Configuration Clinic, Internet Showcase, InteropNet and Solutions Showcase are trademarks of Interop Company. NetWorld is a service mark of Novell, Inc. ©1994 Interop Company, 303 Vintage Park, Foster City, CA 94404. 415-578-6900. Fax: 415-525-0221. Illustration by Kenneth Gilliam Associates/Michael Kunisaki.

Riding a Development Wave

David, we live in a world of choices: cream cheese or jelly, Rush or Larry, PowerPC or Pentium, DMI or PnP. While our readers probably have a handle on the first three sets of choices, they might not know where to start with DMI or PnP. . . and they aren't alone!

DMI stands for Desktop Management Interface, and it's the child of the Desktop Management Task Force or DMTF—a group that includes Microsoft, Intel, IBM, Novell, and other major vendors of hardware and software. PnP is the Plug and Play spec, the child of a group that includes Microsoft, Intel, IBM, Novell, and other major vendors of hardware and software. Both provide vendor-independent ways to manage the pieces and parts of PCs. (Oops, that sounds strange.)

Well, DMI is an API produced by the DMTF that provides a vendor-independent way to manage the pieces and parts of PCs. According to industry sources, DMI will be a part of the promised Chicago operating system—the next rendition of Microsoft Windows. It will use a Management Information File (MIF), probably residing in firmware, that defines a device or object and tells MIF-aware programs how to manage and control it. There will be MIFs for PC components, modems, and printers.

PnP uses a file, sometimes in firmware, that defines a device or object and tells PnP-aware operating systems and programs how to manage and control it. PnP provides a vendor-independent way to manage the pieces and parts of PCs. According to industry sources, Chicago will support PnP. PnP will be in PC components, modems, and printers. (Oops, it gets stranger!)

Okay, so here we have two interface architectures that each promise to identify devices inside a PC down to the board level, provide information about their configuration, and allow management and control. Applications will apparently be able to get information from either interface and use it to load drivers. Each interface might even provide a way to help programs address modems—one of my perennial crusades.

But what's a vendor or buyer to do, focus on DMI or on PnP? Do companies making management software poll for PnP files or for MIF information? David, which should our readers look for when they buy computers, software, and components?



What's a buyer to focus on: DMI or PnP? Should management software poll for PnP files or MIF information?

Relax, Frank. It looks confusing, but at second glance it's only complex. The major difference between PnP and DMI is that the PnP process primarily works at boot time while DMI always functions later. Also, PnP is designed only for the Intel architecture while DMI is trying to work across other platforms.

Yes, both are backed by consortiums with virtually the same members. But this means there are plans to make them work together smoothly. PnP will leave behind information that DMI can use to make a MIF, so creating and buying PnP-compatible products is the first step in supporting DMI-compatible products.

At boot time, PnP products report their identities and capabilities to a configuration-management program, which checks for changes and, if it finds any, tries to allocate the interrupts. Then it writes the information to an .INF file. Except when they detect a new docking station or PCMCIA card, the configuration manager and PnP are dormant.

The PC's DMI program is an active agent designed to communicate outside the PC. DMI can read the PnP .INF file and get a lot of information about the ID and configuration of the PC and its parts. In Chicago, the PnP configuration information will be in a registry database equipped with an API for cross-network queries, so there is room for some overlap of functions. If some components have a MIF, DMI can get more detailed information and, in some cases, gather statistics such as the number of good and bad data blocks reported by a LAN adapter or modem. Central network-management programs can collect this information to detect and diagnose problems.

We'll be reviewing DMI- and PnP-compatible LAN adapters, modems, and other products before fall. It looks like PnP is easier to implement, so we'll initially see more PnP products, but that's okay: Presumably, PnP goes a long way toward contributing toward DMI's network management goals.

In the long term you shouldn't have to worry whether the product uses a DMI agent or a PnP agent. The protocol for accessing information will be the same: the Simple Network Management Protocol (SNMP). Where SNMP is not implemented, Microsoft has committed to providing a common interface to PnP and DMI. Now if Microsoft will only deliver on that claim. . .



For the long term, you shouldn't worry. The protocol for accessing information will be the same: SNMP.

Time is Money!

9:00 AM	Began scheduling the sales conference
2:00 PM	Still resolving people & room conflicts
2:30 PM	Instructed to change the conference date
3:00 PM	Installed CaLANDar
3:15 PM	Finished work and going home early!

Each year millions of dollars are wasted by scheduling, rescheduling and scheduling again until a good time is found for group meetings. Even more money is wasted on trying to control and account for the schedules of conference rooms and other resources.

Now, businesses can save money, become more organized and gain a competitive edge in an ever-increasingly competitive marketplace.

The Best Group Scheduling Software

CaLANDar is group scheduling software for the enterprise. CaLANDar coordinates both group and personal appointments and tasks. Additionally, CaLANDar provides an on-line "rolodex", a telephone message management system, an in/out of the office pegboard, a split-screen, user-to-user chat facility and more.

PC Magazine called CaLANDar "... a powerful and well designed group scheduler." InfoWorld said "CaLANDar offers the strongest combination of power and price at just over half the cost of OnTime and WordPerfect Office."

CALANDAR
Enterprise Scheduling



PC
MAGAZINE
EDITORS' CHOICE
August 23, 1988

© 1988 Microsystems Software, Inc. CaLANDar is a registered trademark of Microsystems Software, Inc. All other products are trademarks of their respective companies.

Cross-platform and E-Mail Enabled

CaLANDar's cross-platform groups scheduling capabilities tightly-couple with all leading LAN based e-mail systems.

DOS

Windows

Macintosh

cc-Mail

Microsoft Mail

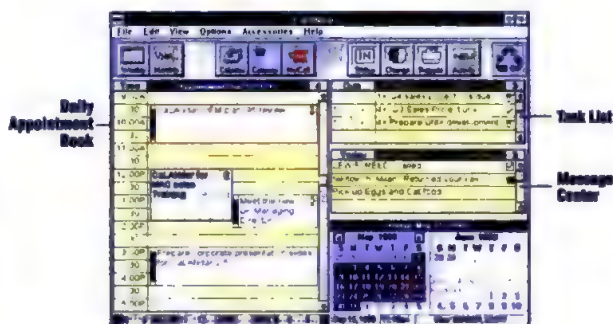
Vines Mail

DaVinci eMail

BeyondMail

Notework

ExpressIt!



Find Out More!

Call today to receive additional information, to order CaLANDar or to request an evaluation copy.

Telephone: (508) 879-9000 FAX: (508) 626-8515

CIRCLE 883 ON READER SERVICE CARD

Network Edition Advertisers Index

Reader Service No.	Advertiser	Page
910	3M Data Storage Products	53
915	American Power Conversion	NE7
903	Arnet	NE5
868	Cheyenne Software	NE37
948	Conner Peripherals	NE34
854	DIGIBOARD	NE33
931	Digital Equipment Corporation	NE16-NE17
852	Frye Computer Systems	NE10
870	Funk Software	NE22
933	Hayes Microcomputer Products	260
*	Hewlett Packard	NE12
921	Kingston Technology	NE8-NE9
869	Kyocera	NE27
883	MicroSystems Software Inc	NE44
858	NOTIS Systems, Inc.	273
905	Novell, Inc	221

Reader Service No.	Advertiser	Page
950	Novell, Inc.	NE2-NE3
881	Novell, Inc.	NE15
853	Olicom USA	NE29
867	Performance Technology	NE24
929	Proteon Inc.	NE23
904	Quarterdeck Office Systems	NE11
865	Rose Electronics	NE28
856	Saber Software	NE31
949	Silicom Connectivity Solutions	NE39
377	Sony Recording Media	NE25
909	Standard Microsystems Corporation ...	NE19-NE21
927	Zyxxel USA	315

* No Reader Service #. Please Call Advertiser For Information.

FOR QUICKER RESPONSE

FAX TO

(805) 828-0582

**FREE NETWORK
PRODUCT INFORMATION**

BUSINESS REPLY MAIL

FIRST CLASS MAIL

PERMIT NO. 433

RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 1687

RIVERTON, NJ 08077-9687

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



Welcome... to the Network Section!

Circle the numbers below corresponding to products featured in the Network Section only. Use reader service card in the back of book to obtain information on other products. Fill in your name and address and answer the questions below. Manufacturers will mail FREE product literature to you.

Void after September 30, 1994

FREE NETWORK PRODUCT INFORMATION REPLY CARD

851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875
876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900
901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925
926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950
951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975
976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999

1. Do you work in a DP/MIS dept.?
01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity: (Check one)

01. ☐ Manufacturer Computer Equip., Computers, Software
02. ☐ Manufacturer-Aerospace
03. ☐ Manufacturer-Other
04. ☐ Systems House
05. ☐ Computer Consultant
06. ☐ Computer Retailer/VAR/VAD Distributor
07. ☐ Communications
08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
09. ☐ Education
10. ☐ Government
12. ☐ Research and Development
13. ☐ Data Processing/Computer Service
14. ☐ Health/Medical/Legal Service
15. ☐ Engineering/Architecture

16. ☐ Agr./Const./Mining/Oil/Transp./Utilities

17. ☐ Non-Computer Retailer/Dist.

18. ☐ Other Business or Service

3. Please indicate your primary business function: (Check one)

01. ☐ DP/MIS
02. ☐ Systems, Programming
03. ☐ Communications
04. ☐ Engineering
05. ☐ Res./Dev./Scientific
06. ☐ Accounting/Finance
07. ☐ Computer Consulting
08. ☐ Purchasing
09. ☐ Operations
10. ☐ Production
11. ☐ Education/Training
12. ☐ Marketing/Sales
13. ☐ Medical/Legal
14. ☐ Admin./Mgmt.

4. Is your company a reseller?
01. ☐ Yes 02. ☐ No

5. For how many nodes do you specify brands of networking products?

01. ☐ 10 or less 03. ☐ 26-99
02. ☐ 11-25 04. ☐ 100 or more

6. Do you plan to buy any network products:

01. ☐ Now 03. ☐ in 7-12 mos.
02. ☐ in 4-6 mos. 04. ☐ no plans

7. Please indicate the connections currently installed or planned for installation within the next 12 months at your current business location:

- | Installed | Planned |
|--|--|
| 01. ☐ LAN to LAN | 04. ☐ LAN to LAN |
| 02. ☐ LAN to Host | 05. ☐ LAN to Host |
| 03. ☐ LAN to WAN | 06. ☐ LAN to WAN |

8. Number of employees in your entire company and at the site where you work:

- | Entire Company | At This Location |
|---|---|
| 01. ☐ 25 or less | 01. ☐ 25 or less |
| 02. ☐ 26-99 | 02. ☐ 26-99 |
| 03. ☐ 100-499 | 03. ☐ 100-499 |
| 04. ☐ 500-999 | 04. ☐ 500-999 |
| 05. ☐ 1000 or more | 05. ☐ 1000 or more |

Name

Title

Company Name

Address

City

Telephone

State

Zip

☐ Please send me a one-year (22-issue) subscription to PC Magazine for \$29.97 (U.S. price); all other countries add \$36.00 for additional postage.

PC 5/17



Welcome... to the Network Section!

Circle the numbers below corresponding to products featured in the Network Section only. Use reader service card in the back of book to obtain information on other products. Fill in your name and address and answer the questions below. Manufacturers will mail FREE product literature to you.

Valid after September 30, 1994

In a Hurry?
Fax This

FREE NETWORK PRODUCT INFORMATION REPLY CARD

851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875
876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900
901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925
926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950
951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975
976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999

PC 5/17-1

1. Do you work in a DP/MIS dept.?
01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity: (Check one)

01. ☐ Manufacturer Computer Equip., Computers, Software
02. ☐ Manufacturer—Aerospace
03. ☐ Manufacturer—Other
04. ☐ Systems House
05. ☐ Computer Consultant
06. ☐ Computer Retailer/VAR/VAD Distributor
07. ☐ Communications
08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
09. ☐ Education
10. ☐ Government
11. ☐ Research and Development
12. ☐ Data Processing/Computer Service
13. ☐ Health/Medical/Legal Service
14. ☐ Engineering/Architecture

16. ☐ Agr./Const./Mining/Oil/Transp./Utilities
17. ☐ Non-Computer Retailer/Dist.
18. ☐ Other Business or Service

3. Please indicate your primary business function: (Check one)

01. ☐ DP/MIS
02. ☐ Systems, Programming
03. ☐ Communications
04. ☐ Engineering
05. ☐ Res./Dev./Scientific
06. ☐ Accounting/Finance
07. ☐ Computer Consulting
08. ☐ Purchasing
09. ☐ Operations
10. ☐ Production
11. ☐ Education/Training
12. ☐ Marketing/Sales
13. ☐ Medical/Legal
14. ☐ Admin./Mgmt.

4. Is your company a reseller?
01. ☐ Yes 02. ☐ No

5. For how many nodes do you specify brands of networking products?

01. ☐ 10 or less 03. ☐ 26-99
02. ☐ 11-25 04. ☐ 100 or more

6. Do you plan to buy any network products:
01. ☐ Now 03. ☐ In 7-12 mos.
02. ☐ In 4-6 mos. 04. ☐ No plans

7. Please indicate the connections currently installed or planned for installation within the next 12 months at your current business location:

- | Installed | Planned |
|--|--|
| 01. ☐ LAN to LAN | 04. ☐ LAN to LAN |
| 02. ☐ LAN to Host | 05. ☐ LAN to Host |
| 03. ☐ LAN to WAN | 06. ☐ LAN to WAN |

8. Number of employees in your entire company and at the site where you work:

- | Entire Company | At This Location |
|---|---|
| 01. ☐ 25 or less | 01. ☐ 25 or less |
| 02. ☐ 26-99 | 02. ☐ 26-99 |
| 03. ☐ 100-499 | 03. ☐ 100-499 |
| 04. ☐ 500-999 | 04. ☐ 500-999 |
| 05. ☐ 1000 or more | 05. ☐ 1000 or more |

Name

Title

Telephone

Company Name

Address

City

State

Zip

☐ Please send me a one-year (22-issue) subscription to PC Magazine for \$29.97 (U.S. price); all other countries add \$36.00 for additional postage.

FOR QUICKER RESPONSE

FAX TO

(609) 828-0332

**FREE NETWORK
PRODUCT INFORMATION**

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 433 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 1687
RIVERTON, NJ 08077-9687

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



User-to-User

BY NEIL J. RUBENKING

Checking for TSRs With MEM

I read both "Tracking TSRs" and "Verifying Memory Configuration" in the May 11, 1993, User-to-User column. I combined the two to produce a simple solution for tracking TSRs loaded in memory without creating marker files.

TSRMEM.BAT (Figure 1) uses the FIND command to search the output of the MEM listing for the TSR name passed as the %1 parameter. If the TSR is not found, the batch file loads it, passing any other command line parameters as parameters for the TSR. Therefore, you could use the line CALL TSRMEM MSCMOUSE /2 in a batch file to load a mouse driver only if it is not already loaded.

Noam Diskin
D.N. Misgav, Israel

► **PC MAGAZINE:** It was a happy coincidence that put those two items in the same column; I can't take credit for it. Indeed, the MEM /C report does contain the name of

every TSR in memory and by processing it with the FIND filter, you can tell whether a particular TSR's name is found in the MEM report. Note the spaces between the quotation marks and %1 in the FIND line. Without these, TSRMEM would seem to find any TSR in memory whose name is contained in the name of a loaded TSR. For example, it would find the imaginary program OSKE any time DOSKEY is loaded.

Unfortunately, you'll still get a few spurious reports, because any word in the MEM report that's surrounded by spaces will be treated as a loaded TSR. For instance, the first line of the report is "Modules using memory below 1 MB:", so TSRMEM will seem to find "using", "memory", "below", and "1" as TSRs in memory.

DOS 6.x provides a solution to

this problem. The MEM command's new /M, or /MODULE, switch reports on the memory used by a particular program. If the specified program is not in memory, MEM reports "<name> is not currently in memory." With TSRMEM6.BAT (Figure 2), you won't get any mistaken reports. Also starting with DOS 6.x, the FIND command returns an exit code of 1 if the specified string is not found. TSRMEM.BAT had to rely on the fact that redirecting the output of a failed FIND produces a 0-byte file and that the COPY command won't copy a 0-byte file. Thanks to DOS 6.x's enhancement of FIND, TSRMEM6.BAT can use a simple IF ERRORLEVEL test instead.

You can download both batch files from PC MagNet's Utilities/Tips Forum, archived as TSRMEM.ZIP.□

```
@ECHO OFF
REM TSRMEM.BAT - Tests if a TSR program already loaded.
REM                      If not - loads the TSR.
IF NOT '%1'=='' GOTO START
ECHO Usage: [CALL] TSRMEM TsrName [TsrParameter [...]]
GOTO FIN
:===== START =====
MEM /C | FIND /I " %1 " > TSRMEMS1.TMP
COPY TSRMEMS1.TMP TSRMEMS2.TMP > NUL
DEL TSRMEMS1.TMP
IF EXIST TSRMEMS2.TMP GOTO LOADED
ECHO %1 NOT LOADED ... NOW LOADING
%1 %2 %3 %4 %5 %6 %7 %8 %9
GOTO FIN
:===== LOADED =====
DEL TSRMEMS2.TMP
ECHO %1 ALREADY LOADED ...
:===== FIN =====
```



Figure 1: TSRMEM.BAT checks whether the specified TSR is present in memory and loads it if not.

```
@ECHO OFF
REM TSRMEM6.BAT - Tests if a TSR program already loaded.
REM                      If not - loads the TSR.
REM Uses the MEM /M switch introduced in DOS 6
IF NOT '%1'=='' GOTO START
ECHO Usage: [CALL] TSRMEM TsrName [TsrParameter [...]]
GOTO FIN
:===== START =====
MEM /M %1 | FIND "not currently in memory" > NUL
IF ERRORLEVEL 1 GOTO LOADED
ECHO %1 NOT LOADED ... NOW LOADING
%1 %2 %3 %4 %5 %6 %7 %8 %9
GOTO FIN
:===== LOADED =====
ECHO %1 ALREADY LOADED ...
:===== FIN =====
```



Figure 2: TSRMEM6.BAT relies on new features of DOS 6.0 to streamline TSRMEM.BAT and to avoid detecting nonexistent programs in memory.

► IN THIS SECTION

Tutor 261
Toolkits 269
Environments 271
Power Programming 283
Utilities 291
Solutions 299

Hayes Delivers The New Standard For High-Speed Global Communications.

**"FASTEST
PERFORMANCE"**

*PCWeek Labs Testing



Four Times Faster Than A 14,400 Bit/s Modem!

Introducing the Hayes® OPTIMA™ 288 V.FC™ + FAX. An incredibly advanced modem that incorporates the

\$579
Estimated Retail Price



V.Fast Class™ 28,800 bit/s technology developed by Hayes and Rockwell International. The same technology that's being supported by more than 125 other modem manufacturers worldwide as the new industry standard for high-speed performance. OPTIMA 288 not only communicates with other *V.Fast Class* modems, it will work with future Hayes modems incorporating the ITU-T V.34(V.Fast) standard. And, it communicates easily with today's installed base of modems.

Faster Than You Think. With the enhanced technology of Hayes, you'll obtain *twice* the speed you thought you'd get from a 28,800 bit/s modem. OPTIMA 288 supports port speeds up to 230,400 bit/s and transfers graphics files at 200,000 bit/s. It's especially powerful for remote connectivity to or from a LAN,

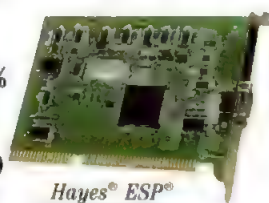


remote control, transferring large files, or multi-media. You could save as much as 75% on connect charges. OPTIMA 288 provides the clarity and convenience of FAX at 14,400 bit/s, **plus fast, easy-to-use Smartcom™ for Windows™ LE data communications software, and Windows FAX software.**

Add The Hayes® ESP® Communications Accelerator for \$99ERP. Our fast Serial Port helps prevent data loss and achieve speeds of 230,400 bit/s when using Windows or LAN based communications.

For more information or to find out about our Corporate Offer, call **800-HAYES-28**, or call our FAX back service **Hayes FAX Response at 800-HAYES-FX** and request Document 288.

In Canada, call us at **800-665-1259**.



*Hayes® ESP®
Communications
Accelerator*

Hayes®
Increasing the Speed
of Business.™



*Fastest in four out of five file transfer tests. Go Online With Hayes BBS: call 800-874-2937 or 404-446-6336. ©1994 Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348. Hayes, the Hayes icon, the Hayes logo and ESP are registered trademarks, and the Hayes '302 Escape Sequence Patent icon, Increasing the Speed of Business, OPTIMA, and Smartcom are trademarks of Hayes Microcomputer Products, Inc. V.Fast Class and V.FC are trademarks of Rockwell International Corporation. Other trademarks mentioned are those of their respective companies. Estimated price is in U.S. dollars.

CIRCLE 933 ON READER SERVICE CARD

Tutor

BY JEFF PROSISE

Windows Multitasking

You're working in Windows, and you're typing a letter in a word processor in one window while waiting for a lengthy spreadsheet recalculation to finish in another window. You may wonder, "How can Windows possibly be running two programs at once when my PC only has one processor?" Of course, the programs aren't truly running simultaneously, but Windows gives the illusion that they are by divvying up processor time among them. The next logical question is "What internal mechanisms allow Windows to do this?"

Unlike Windows NT and OS/2, which employ the more sophisticated form of multitasking known as *preemptive multitasking*, Windows 3.x uses a form called *nonpreemptive* or *cooperative multitasking* to share processing time among Windows applications. In a preemptive multitasking system, the operating system sets up a timer and switches from one program to another when a predetermined time period elapses. (Actually, it's a little more complicated than that, but the concept is accurate.) This kind of multitasking is known as *time-slicing*, because each program in turn gets a "slice" of processor time to do its work.

In a cooperative multitasking system, the operating system switches to another program only when the program that is currently running gives its permission. In effect, the currently running application has to raise a flag that says, "I've had my time; give somebody else a slice of the CPU time and come back to me when you're ready." That is perhaps an overly simplistic view of how cooperative multitasking works, but it paints an accurate

picture of how the bulk of the responsibility for smooth multitasking falls to applications, not to the operating system (in 16-bit versions of Windows).

In order to understand better the difference between preemptive and cooperative multitasking and the implications that these forms of multitasking have for end users, we'll go behind the scenes and more fully examine the Windows multi-

In order to understand better the difference between preemptive and cooperative multitasking, we'll go behind the scenes and examine the Windows multitasking model.

tasking model. We'll contrast this form of multitasking with the forms used in Windows NT and OS/2 and discuss a major difference in the architectures of NT and OS/2 that affects multitasking. One of the surprising facts you'll learn along the way is that Windows 3.x actually does use preemptive multitasking—but in a way that you wouldn't expect.

COOPERATIVE MULTITASKING Multitasking in Windows is intimately linked with the concept of *messages*. A Windows application spends most of its time receiving and processing messages. Windows 3.1 defines several hundred message types, ranging from common ones such as WM_

PAINT (telling an application that it needs to repaint its window) and WM_SIZE (informing an application that its window size is changing) to relatively obscure ones such as WM_NCDESTROY (notifying an application that the window's nonclient area—the title bar, border, and other elements surrounding the paintable portion of the window—is being destroyed). Some messages are sent directly to a program. Others are placed in the program's application message queue, where they wait until the program retrieves them. (A *message queue* is an area of memory where messages can be stacked up while they await processing, similar to the keyboard buffer that your computer's BIOS sets up in low memory to store key codes.) Input messages generated by the mouse and keyboard go to a separate message queue, called the *system message queue*, where they, too, wait to be retrieved. Each application has its own application message queue, but there is only one system message queue. The system message queue is shared by all applications.

The heart of every Windows program is a few lines of code called the *message loop*, which retrieves a message from either message queue (application or system), sends the message to the part of the program that processes messages (the *window procedure*), and loops back and repeats the procedure. Programs usually call Windows' GetMessage function to retrieve a message and DispatchMessage to send, or *dispatch*, the message to the window procedure. A message loop can be as simple as this:

```
while (GetMessage(&msg, NULL, 0, 0))
    DispatchMessage(&msg);
```

As long as GetMessage returns non-zero, messages are continually retrieved and dispatched. Windows programs typically retrieve and dispatch several messages per second. When you use a spy program to monitor message traffic on a 486, you'll see that messages go by faster than you can read them. The while loop ends when GetMessage returns 0, which indicates to the program that it's time to terminate—specifically, that GetMessage retrieved a WM_QUIT message from the message queue.

So what does this have to do with mul-

titasking? In a cooperative multitasking system, it's up to each program to yield so that other programs can get a slice of the CPU time. When a Windows program calls GetMessage and there are no messages waiting for it, GetMessage passes control to the Windows scheduler, which then allots processing time to other programs that have messages waiting for them. In effect, a program performs an implicit yield when it uses GetMessage, because Windows can let other programs do some work before GetMessage returns.

Scheduling is done on a round-robin basis. Programs are scheduled in the order in which they appear in the linked list of task databases (TDBs), which Windows maintains internally. It is a little-known fact that Windows programs are assigned priority levels and that programs with higher priorities receive scheduling preference. Very few programs adjust their priority levels, in part because the SetPriority function used to change priority levels is undocumented, and in part because priority levels are only marginally beneficial in a cooperative multitasking environment. No matter how high a program's priority, control will never be wrested away from a lower-priority program until that program calls GetMessage or yields in some other manner. For more information on the operation of the Windows scheduler and the role that priority levels play, read chapter 6 of Matt Pietrek's *Windows Internals* (Addison-Wesley, 1993). Pietrek also documents some instances in which GetMessage will yield even if there are messages waiting. All of which goes to show that in an environment as complicated as Windows, there are exceptions to almost every rule.

THE FLY IN THE PUDDING Cooperative multitasking works fine as long as every program in the system checks the message queues often. Processing time is distributed among all active programs, and everything runs smoothly. But problems occur if an ill-behaved application goes too long without yielding to other applications.

Suppose you give your spreadsheet program the command to recalculate, and the recalc function requires 10 seconds to run. Unless the spreadsheet program takes special steps to yield periodically while in the midst of processing the

message, other programs will be suspended for the entire 10 seconds. The rest of the system will be frozen until the recalc function returns, refusing even to let you switch to another application program. That's cooperative multitasking at its worst. Some programs change the cursor to an hourglass when they're about to undertake a lengthy operation, but that's a courtesy, not a solution. The hourglass tells you that you're temporarily dead in the water. It doesn't enable you to switch to another application and get on with your work.

OS/2 AND NT TO THE RESCUE That's one reason the preemptive scheduling model used in Windows NT and OS/2 (and the forthcoming version of Windows, code-named *Programming the OS/2 Presentation Manager* (Microsoft Press, 1989). Helen Custer briefly discusses the NT input model in *Inside Windows NT* (Microsoft Press, 1993) and Jeffrey Richter examines the NT input model in gruesome detail in chapter 6 of his book, *Advanced Windows NT* (Microsoft Press, 1994).

In addition to dispensing CPU time more evenly among applications and genuinely giving extra attention to tasks with higher priorities, a preemptive system will continue to run other programs even if one program fails to yield processor time. Rather than relying on applications to yield voluntarily, a preemptive scheduler takes control of the CPU whenever it needs to, interrupting the active program and resuming execution of an inactive one. Things continue to run smoothly even if one application is ignoring the messages posted for it. When you ponder the scheduling mechanisms employed by Windows, Windows NT, and OS/2, a key point to remember is that Windows 3.x will not interrupt an application while it is processing a message, while NT and OS/2 may interrupt a program at any time—even as a message is being processed.

There is, however, a flaw in OS/2 that reduces its effectiveness at multitasking. In OS/2, as in Windows 3.x, there is but one system message queue, which is shared among all applications. If a message for application A is sitting at the head of the message queue, and application A takes its sweet time getting to that message, other applications are blocked from the system message queue. If you

attempt to switch to an inactive program by clicking the mouse on it, the mouse message won't get through, and the program won't be activated until after the program that is blocking the queue has completed its own message processing. This is the impetus behind OS/2's "1/10-of-a-second" rule, which advises that message processing should never take more than 1/10 of a second. NT's designers eliminate this problem by assigning each application its own input queue. One application can no longer suspend other applications by ignoring input messages. If you're interested in learning more about this subject, Charles Petzold discusses the limitations of the OS/2 input model in chapter 17 of his book

Enhanced-mode Windows

3.x does multitask

programs preemptively—

but only DOS programs,

not Windows programs.

.....

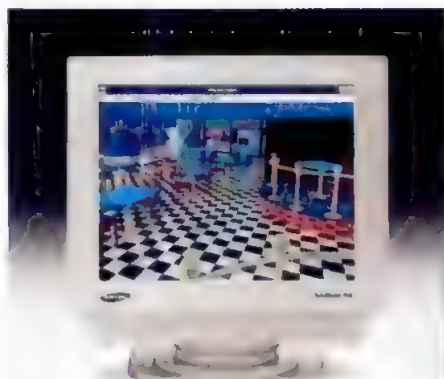
Lest you think that the OS/2 problem is more serious than it is, keep in mind that well-written OS/2 applications take steps to avoid blocking the input queue, just as well-written Windows 3.x apps use secondary message loops and other devices to ensure that multitasking remains smooth and efficient. The scenarios described above are worst case, and the market has a way of rooting out worst-case applications.

WINDOWS DOES IT TOO Windows 3.x is not a preemptive multitasker. Or is it? Don't be too quick to disparage 16-bit Windows' multitasking model for its cooperative nature.

Enhanced-mode Windows 3.x does multitask programs preemptively—but only DOS programs, not Windows programs! DOS programs run in separate Virtual-86-mode virtual machines (VMs). 80386 and higher CPUs enable the operating system to create separate, stand-alone DOS VMs, each of which simulates

Samsung

A new point of view.



SyncMaster 14GL



SyncMaster 15GL



SyncMaster 17GL

First impressions are important. So take a good look at the new SyncMaster™ GL Series monitors. You'll find they're easy on your eyes and even easier on your pocketbook.

Samsung took for granted you wanted bright, crisp clear images that don't flicker. You're also concerned about things like safety and energy conservation, so they're standard on the whole series.

Life should be as hassle-free as possible, so we added new ideas like On-Screen Display, and all SyncMaster GL Series monitors come with a two-year warranty.

Look at what it takes to satisfy your monitor needs. Samsung did. And came up with a whole new point of view. For more information, Call 1-800-933-4110.

TECHNOLOGY
THAT WORKS
FOR LIFE



©1994 Samsung Electronics America, Inc. The EPA Energy Star logo is not to be considered a product endorsement and is only on SyncMaster 14GL courtesy of Intergraph. Image on SyncMaster 15GL courtesy of American Business.

SyncMaster	14GL	15GL	17GL
Size	14"	15"	17"
Dot Pitch	28	28	28
Maximum Resolution	1024 x 768	1024 x 768	1280 x 1024
Maximum Refresh Rate at Maximum Res (Hz)	76	76	60
MPR-II (Low radiation)	•	•	•
Power Management	•	•	•
Flat Square Screen	•	•	•
On-Screen Programming	•	•	•
Warranty	2 Years	2 Years	2 Years

CIRCLE 046 ON READER SERVICE CARD

a complete 8086 machine. A DOS app running in a VM thinks it's the only app running, when in fact there may be other apps running in other VMs. The DOS VMs get preemptively multitasked; Windows applications run in a common VM known as the *system VM* and do not get preempted. Figure 1 illustrates the relationship among DOS VMs, the system VM, and the two Windows schedulers. The preemptive scheduler lives inside the component of Windows known as the *virtual machine manager* (VMM), which runs in ring 0—the processor's most privileged level of operation—and among other things manages multitasking among VMs. The cooperative scheduler lives and acts only within the context of the system VM. In other words, it acts within the time slices allotted to the system VM by the VMM; all Windows applications are treated as a single preemptible task.

Now that you understand the relationship among DOS VMs and the system VM, it should be easier to understand how the

can assign Windows in Foreground and Background values. These values specify the relative priority levels for the system VM. In the PIF Editor, you can assign Foreground Priority and Background Priority levels. These values specify the relative priority levels for the DOS app managed by this PIF. Once a DOS VM is running, you can modify the Foreground and Background Priority levels through the Settings option in the system menu. (For the DOS VM to run when it's not in the foreground, you must have the Background check box checked.)

To determine how much time to allot to each running task, the preemptive scheduler sums the background priority values for all background tasks and the foreground priority value for the foreground task. Each task gets an amount of processor time that is proportionate to its current priority level divided

priority of 100. The DOS VMs, which are in the background, have relative priorities of 50 and 25. Summing these priority values yields 175. The system VM's foreground priority level is 100, so it gets 100/175, or 57 percent, of the processor's time. As a background task, DOS VM 1

VM Name	Fore	Back	CPU %	
System VM	100	50	57	☒ Fore
DOS VM 1	100	50	29	☐ Fore
DOS VM 2	50	25	14	☐ Fore
				☐ Fore
				☐ Fore

Figure 2: VM.EXE calculates what percentage of the processing time each VM will receive when you fill in the foreground and background priorities and choose one VM to be in the foreground.

gets 50/175, or 29 percent, of the processor's time, while DOS VM 2 gets the remaining 14 percent. But if DOS VM 2 comes to the foreground, its share of the processor gets boosted to 33 percent, because its relative priority changes to 50, while the priorities of the system VM and DOS VM 1 both drop to 50.

If all this seems clear as mud, try this simple exercise. Create a table on a piece of paper that lists the currently executing VMs as well as their foreground and background priority values. Then pick a VM to be in the foreground and add its foreground priority to the background priorities of the other VMs. To determine the percentage of processor time accorded any VM, divide that VM's current priority value by the total and multiply by 100. Then repeat the process assuming a different application is in the foreground.

And if that's too much bother, download technical editor Neil Rubenking's Visual Basic program VB.EXE, which does all the calculation for you (see Figure 2). You fill in the values for each VM's foreground and background, and then click the Fore radio button next to any one of them. The "CPU %" column automatically fills with the percent for each VM when the selected VM is in the foreground. You can find VM.EXE in the Tutor section of PC MagNet's Utilities/Tips Forum. It requires VBRUN300.DLL, which you'll find in the same forum's Windows & OS/2 Utils section. □

The Windows Multitasking Model

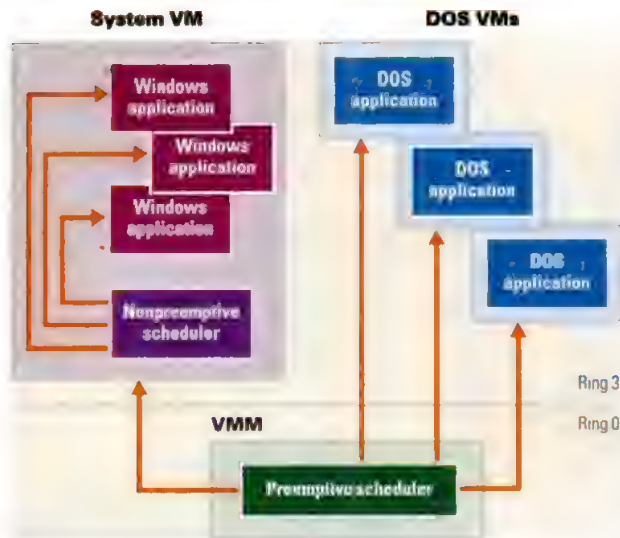


Figure 1: Windows 3.x multitasks Windows applications nonpreemptively, but it divides CPU time among DOS VMs and the system VM preemptively. The preemptive scheduler resides inside the VMM and manages multitasking among VMs. The nonpreemptive scheduler acts only within the system VM and allocates processor time among all running Windows applications.

scheduling-priority values assigned in the Control Panel's 386 Enhanced-mode dialog box and in the PIF Editor interrelate. In the 386 Enhanced-mode dialog box, you

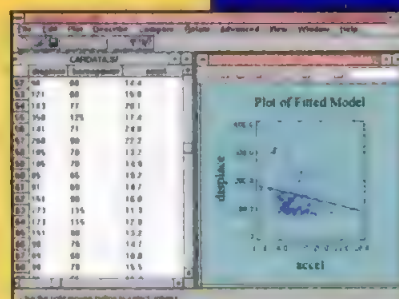
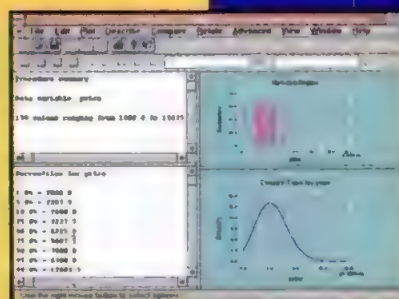
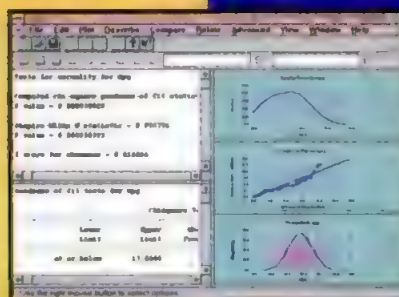
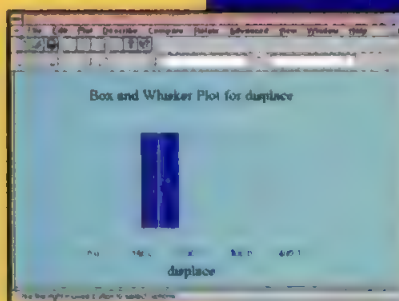
can assign Windows in Foreground and Background values. These values specify the relative priority levels for the system VM. In the PIF Editor, you can assign Foreground Priority and Background Priority levels. These values specify the relative priority levels for the DOS app

Read This if You're **CRAZY** About Statistics:

The more you know about statistics, the more you'll love STATGRAPHICS *Plus*. With its completely menu-driven procedures, spectacular interactive 3-D graphics, and a choice of DOS or Windows versions, STATGRAPHICS *Plus* wraps together everything you've ever wanted in a statistics package.

STATGRAPHICS *Plus* makes complicated statistics easy. Point-and-click menus give you access to regression analysis, ANOVA, quality control, experimental design, multivariate and time series methods, nonparametric statistics, and much more. And STATGRAPHICS *Plus* for Windows includes our revolutionary new StatFolio, which makes saving and reusing your work a breeze. Then, when you need to rerun last week's analysis on a new set of data, just a few mouse clicks will recalculate everything automatically.

If you're ready for statistical graphics software that thinks the way you do, call us for details about STATGRAPHICS *Plus*. You'd be crazy not to.



Read This if Statistics Drives You **CRAZY**:

The less you know about statistics, the more you'll love STATGRAPHICS *Plus*. Because you can use it to master statistics even if you barely *remember* statistics. STATGRAPHICS *Plus* is the easiest-to-learn, easiest-to-use statistical analysis package you can buy. And it's available in both DOS and Windows versions.

No matter how little you remember, or ever learned, about statistics, STATGRAPHICS *Plus* knows it all. In fact, *PC Magazine* says that STATGRAPHICS *Plus* "artfully combines statistics, graphics and data manipulation in an almost seamless way." With just a few keystrokes or mouse clicks, STATGRAPHICS *Plus* will help you make an accurate sales forecast, improve a manufacturing process, or work toward a cure for cancer. And if you ever need assistance, you can rely on our award-winning documentation, intelligent on-line help, and telephone support.

Fact is, STATGRAPHICS *Plus* is the perfect statistical graphics package for people who aren't crazy about statistics. After all, your data analysis problems shouldn't have to drive you insane.

STATGRAPHICS® *Plus*

In Maryland, 301-984-5123, Outside the U.S., 301-984-5412

800-592-0050, ext. 200

Manugistics, Inc., 2115 E. Jefferson St., Rockville, MD 20852. STATGRAPHICS is a registered trademark of Statistical Graphics Corporation. Quote reprinted from *PC Magazine*, May 11, 1993. Copyright ©1993 Ziff Davis Publishing Company, L.P. Other trademarks are the property of their respective owners. STATGRAPHICS *Plus* runs on 386, 386SX, and 486 computers with at least 4 MB of RAM and a graphics card. DOS version for 286/640K machines also available. Authorized international dealers: Australia (03)866 1766, United Kingdom (071)436 9481, France (01)45 27-20-61, Germany (089)45114-0, (069)80053-0, (0212)339099, Italy (02)29404830, Spain (01)5350125, Sweden (031)776 01 21, Netherlands (03402)66336, Hong Kong 851-7998, Korea (02)222 3418, Taiwan (02)788-6777, Malaysia (031)717-0077, Poland (012)128-270, Singapore 254-5245.

CIRCLE 365 ON READER SERVICE CARD

Believe it. Our Pentium™ processor and DX4™ processor-based desktops are ready to go. Austin Direct delivers the blazing, unabashed power of Intel's new Pentium chip. Right now. Right to you. At the right price. What else would you expect from the winner of PC WORLD's Best Buy Award? **Call today. They're going fast.**

Austin P5-66 \$2,999 Lease \$119/mo.*

- Intel 66MHz Pentium processor
- 16 MB RAM, 256 KB L2 cache
- 540 MB hard drive
- PCI-bus Windows accelerator with 2 MB
- 15" NI SVGA monitor
- 2 PCI, 1 PCI/ISA, and 4 ISA slots
- MS-DOS 6.2, Windows 3.1, MS Works

Austin P5-60 \$2,399 BEST VALUE! Lease \$95/mo.*

- Intel 60 MHz Pentium processor
- 8 MB RAM, 256 KB L2 cache
- 425 MB hard drive
- PCI-bus Windows accelerator with 2 MB
- 14" SVGA monitor
- 2 PCI, 1 PCI/ISA, & 4 ISA slots
- MS-DOS 6.2, Windows 3.1, MS Works



March 1994

Premier Intel DX4-100† \$2,299 Lease \$91/mo.*

- Intel DX4 100 MHz processor
- 8 MB RAM, 256 KB L2 cache
- 425 MB hard drive
- PCI-bus Windows accelerator with 2 MB
- 14" SVGA monitor
- 2 PCI, 1 PCI/ISA, & 3 ISA slots
- MS DOS 6.2, Windows 3.1, MS Works

Upgrade options

Sound system upgrade

(sound card, double-spin Sony CD-ROM, speakers) **\$259**



pentium
PROCESSOR

Austin's New Pentium

Imagine having one on

It's true. Call Austin Direct first for fully-loaded computers without the heavy price tag. With Austin's on-time delivery, our latest systems and processors, competitive prices, and lifetime product and support, every purchase is a smart one. Start out with Austin's slim line 486 and 486 DX2 systems. You'll get some of the best performance values around.

Genesis 486DX-33 \$1,559 Lease \$62/mo.*

- Intel 486DX-33 processor
- 4 MB RAM, 128 KB cache
- 212 MB hard drive
- 1 MB local bus Windows accelerator
- 14" SVGA monitor
- 5 16-bit ISA slots
- MS DOS 6.2 & Windows 3.1

Genesis 486 DX2-66 \$1,799 BEST VALUE! Lease \$72/mo.*

- Intel 486DX2-66 processor
- 4 MB RAM, 128 KB cache
- 212 MB hard drive
- 1 MB local bus Windows accelerator
- 14" SVGA monitor
- 5 16-bit ISA slots
- MS DOS 6.2 & Windows 3.1

Premier 486 DX2-66 \$2,179 Lease \$87/mo.*

- Intel 486DX2-66 processor
- 8 MB RAM, 128 KB L2 cache
- 425 MB hard drive
- 2 MB local bus Windows accelerator
- 2VL and 6 16-bit ISA slots
- MS DOS 6.2 & Windows 3.1



We've got DX2 and DX4 notebooks, too.

Austin Direct skillfully combines the remarkable, show stopping power of the new IntelDX4 and DX2 chips with the portable convenience of its feature-filled notebooks. All at prices you can only imagine. **Call now. They're really moving!**

All notebook models listed below offer: **32-bit local bus video and Windows accelerator. 1 MB video RAM. 2 PCMCIA slots. Front and center trackball. Expandability up to 32 MB memory.**

DX4-75 Austin Notebook¹ \$4,999 Lease 199/mo*

- 8 MB RAM
- 524 MB hard drive
- TFT active color display

DX2-66 Austin Notebook \$4,199 Lease \$167/mo*

- 8 MB RAM
- 340 MB hard drive
- TFT active color display



DX-33 Austin Notebook \$2,599 BEST VALUE! Lease \$107/mo*

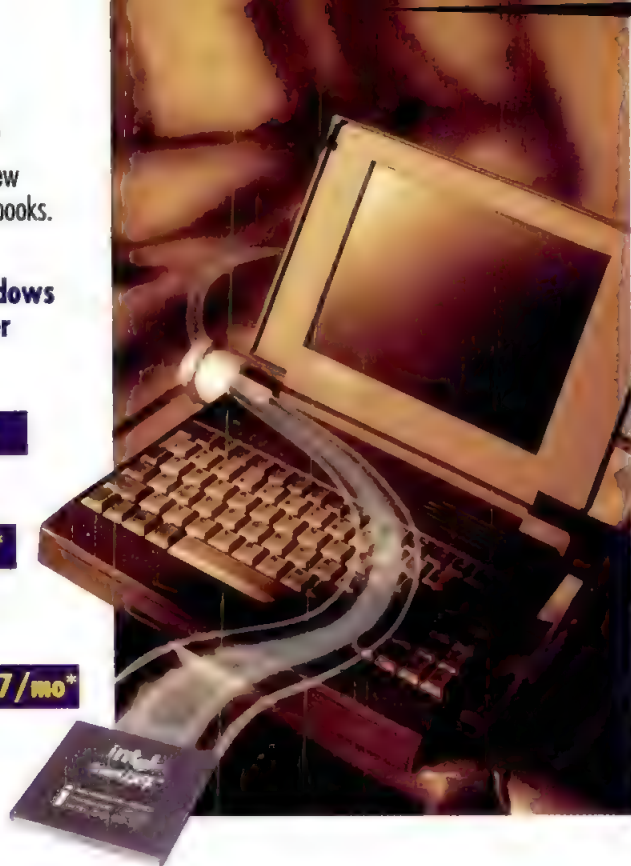
- 4 MB RAM
- 262 MB hard drive
- DSTN color display

DX2-66 Austin Notebook \$2,999 Lease \$119/mo*

- 8 MB RAM
- 340 MB hard drive
- DSTN color display

Add-on options

Docking station \$299; 14.4 modem \$299;
NiMH battery \$149; Battery charger \$49; Carrying case \$29



and DX4 Computers your desk. Right now.

We're with you after the sale, too. No matter what. In fact, Austin Direct offers one of the strongest, most customer-oriented service and support programs you'll find anywhere. So, whether you purchase one system or 100, standard or custom configurations, you'll still receive:

Lifetime tech support 7 days a week • An average tech support response time of under 2 minutes • Lifetime BBS support • 2 year warranty • 2 years parts & labor** • 1 year on-site warranty** • 30 day money-back guarantee**



Recipient of 1991 Austin
Commitment to Quality Award
from the City of Austin



Feb. 1, 1992
Austin 400-331

Call 1-800-752-1577

For more information by fax: 1-800-341-7500

Government Sales: 1-800-833-4472

Corporate Sales: 1-800-622-5506

AUSTIN D-I-R-E-C-T

2121 Energy Drive, Austin, TX 78758
Phone 512-339-3500 FAX 512-454-1357

Ad Code: PCM594

©1994 Austin Direct. All rights reserved. The Intel Inside logo is a registered trademark of Intel Corp. Microsoft is a registered trademark and Windows and the Windows logo are trademarks of Microsoft Corp. All other company names and products are trademarks or registered trademarks of their respective owners. The above are special promotional prices. Prices and specifications are subject to change without notice. ¹ DX4-based systems shipping soon. ² Lease term reflects 36-month contract. ³ ** Notebook Systems warranty includes one year parts and labor and return to factory service only.

Okay. So Here's A Notebook We Can't Connect To Your Token-Ring.



When it comes to true notebook Token-Ring connectivity, Xircom is the undisputed industry leader.

We've connected ten times as many notebooks to Token-Ring networks as IBM. Or anyone else.

For the simple reason that our Token-Ring adapters are compatible with more brands, types and makes of notebooks than anyone else's.

In fact, we offer a Token-Ring solution for every notebook ever made. Whether it features a PCMCIA slot or a standard parallel port.

Our new CreditCard Token Ring Adapter is compatible with every PCMCIA notebook and our Pocket Token Ring Adapter III connects to any parallel port. Guaranteed or your money back. Either adapter puts you on the LAN - at 16 or 4 Mbps. You can achieve even greater performance and reduce memory consumption with our SmartRing™ software. What's more, Xircom Pocket Adapters all feature a Phantom Power Cable that

eliminates the need for carrying around a cumbersome AC adapter.

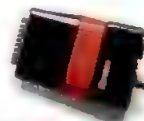


Both our Token-Ring adapters come with a full five-year warranty.

So call your VAR or dealer today and buy one. Or take advantage of our 50% off trade-up offer on any PCMCIA or pocket LAN adapter by calling us directly at 1-800-438-4526 ext. 34B for more information.

And get a Token-Ring solution that's guaranteed to fit whatever kind of notebook you've got.

Unless of course, it's the spiral-bound variety.



Xircom

The easiest way to go from notebook to network.

Toolkits

BY RICK KNOBLAUGH

Hide Programs With Cloaking

Programmers and end users alike know the previously unbreakable rule that states executable code must be loaded into conventional memory—that scarce and precious portion below 1MB. You can load the data used by a TSR into extended memory, but the executable portion must be loaded in conventional memory. At least that was the case before Helix Software developed its *cloaking* technology.

This technology has now been made available to developers through Cloaking Developer's Toolkit, Version 1.01 (\$299). Just like in *Star Trek*, where enemy ships could go undetected by enabling their cloaking devices, cloaked programs can hide by operating outside conventional memory. Cloaking Developer's Toolkit includes the NetRoom 3.0 memory manager (which was an Editors' Choice in "What's the Price of a Free Lunch?" *PC Magazine*, September 14, 1993), all NetRoom 3.0 supplemental utilities, device drivers for DOS and Windows, documentation on the cloaking API, and a cloaking-specific version of Nu-Mega Technologies' Soft-ICE debugger.

HOW IT WORKS Cloaked client programs execute in protected mode, inhabiting extended memory along with Helix's cloaking host. If the cloaked client hooks any software interrupts (as do most TSRs and device drivers), the client will leave a tiny stub of code in conventional memory—about 11 bytes per interrupt. The stub merely activates the cloaking host when the hooked interrupt occurs. This causes the host to call the protected-mode portion of the

cloaked program, where interrupt processing can take place outside of conventional memory. When processing is complete, the host returns control to the real-mode stub code, which can then chain back to the original interrupt handler.

The cloaking host facilitates this scheme by creating a virtual machine. That is, it sets itself up in protected mode, and then manipulates the environment so that it gains control when interrupts occur. This takes place transparently to DOS, which is executed in Virtual 86 mode.

There are two methods by which the stub can activate the cloaking host, but the most straightforward is by generating an INT 2Ch—a special signal to the host. When INT 2Ch is detected by the host, it causes the machine to enter protected mode, and then calls back the cloaked client for processing the interrupt.

The cloaking host can take two forms: Helix's NetRoom 3.0 memory manager, which provides built-in support, or a device driver (CLOAKING.EXE for DOS, CLOAKING.386 for Windows), which can be licensed for distribution with your cloaked programs. There are some services that aren't available with CLOAKING.EXE, but its advantage is that it can be used with any memory manager.

This approach gives you the benefits of fast, 32-bit code that executes at the unfettered privilege level of ring 0. The potential dangers of ring 0 programming are mitigated by the host API functions. Together, the ring 0 privilege level and

the cloaking host services provide some powerful capabilities. For example, you can redirect hardware interrupts by modifying the Interrupt Descriptor Table (IDT), which lets you service interrupts in real time because you don't have to go through stub code. Also, since the stub isn't necessary, this method takes up 0 bytes of conventional memory. (If CLOAKING.EXE is the host, you can't hook IDT entries for hardware interrupts unless Windows is running.)

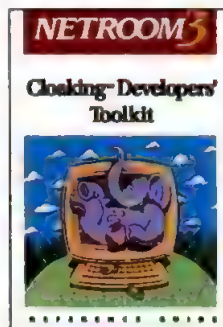
NOT FOR BEGINNERS The bundled Soft-ICE debugger typically does an adequate job, but be forewarned that this cloaked version of Soft-ICE isn't as robust or as full-featured as the standard version. There are some problems that don't exist in the standard version, and some features, such as breakpoints on I/O accesses, are not available. Also, it ships with the standard Soft-ICE manual, and these differences are not noted anywhere (not even in a README file), which can make for confusion.

The slim reference guide defines the cloaking API services and provides technical descriptions of how to detect the cloaking host and load your cloaked programs. It is sorely lacking in high-level descriptions of the methodology, tutorials, and detailed code samples; only one sample program (an .ASM file) is provided. This is enough for developers well schooled in protected-mode, system-level programming, but it is inadequate for anyone without such expertise.

Cloaking Developer's Toolkit 1.01 is not for beginners. But if you are an expert system-level programmer and have large TSRs or drivers that you'd like to load outside conventional memory, Cloaking Developer's Toolkit is for you. The bundled NetRoom 3.0 memory manager and Soft-ICE debugger make it an especially good value.

• Cloaking Developer's Toolkit, Version 1.01

List Price: \$299. Requires: 386-based PC or better, 1MB RAM. Helix Software Co., 47-09 30th St., Long Island City, NY 11101; 800-451-0551, 718-392-3100. Circle 441 on the reader service card



descriptions of the methodology, tutorials, and detailed code samples; only one sample program (an .ASM file) is provided. This is enough for developers well schooled in protected-mode, system-level programming, but it is inadequate for anyone without such expertise.

Cloaking Developer's

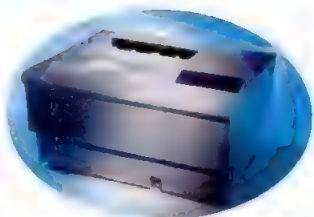
Toolkit 1.01 is not for beginners. But if you are an expert system-level programmer and have large TSRs or drivers that you'd like to load outside conventional memory, Cloaking Developer's Toolkit is for you. The bundled NetRoom 3.0 memory manager and Soft-ICE debugger make it an especially good value.

• Cloaking Developer's Toolkit, Version 1.01

List Price: \$299. Requires: 386-based PC or better, 1MB RAM. Helix Software Co., 47-09 30th St., Long Island City, NY 11101; 800-451-0551, 718-392-3100. Circle 441 on the reader service card

cheap and fast

We're proud of our printer's reputation. And we're also proud of the Silentwriter® 1097's many features. Features like 600 DPI print quality, and PhotoMatch™ grayscale. Along with PC and Macintosh connectivity, Adobe PostScript™ software, HP® LaserJet® III emulation, plus Automatic Emulation Switching. Our Novell network capability. Not to mention our extremely fast RISC-based 10ppm print speed. With all of these features for under \$1500 it doesn't matter what you call us. As long as you call. 1-800-NEC-INFO. Or for information via fax, call NEC FastFacts™ at 1-800-366-0476, request document #791097. **NEC**



CIRCLE 394 ON READER SERVICE CARD

Environments

BY CHARLES PETZOLD

The Windows NT Matrix Transform

As is often the case, "the best laid schemes of mice and men" turn out to be not quite in accordance with reality. Software development projects rarely go as smoothly as planned. It's really a problem with any type of engineering: There's always that huge rock you discover 6 feet below the surface.

Since the beginning of this year, we've been looking at enhancements to the Windows Graphics Device Interface (GDI) as implemented under Windows NT, focusing mainly on wide lines and paths. In this column I had planned to show how to use paths with TrueType fonts to create interesting graphics effects (much as I demonstrated with the OS/2 Graphics Programming Interface last year). For reasons that will become apparent in the next installment of this column, I discovered that some preliminaries are necessary. In short, we must first tackle the subject of coordinate transforms under Windows NT.

FROM LOGICAL TO DEVICE In a two-dimensional graphics system, such as Windows, a transform is simply a mathematical conversion of a coordinate point (x, y) to a different point (x', y') . Although Windows programmers are free to draw in units of pixels, it's often more convenient to use other units. These may be standard units of measure, such as inches or millimeters, or something completely arbitrary.

Windows has always had this facility.

Using the terminology of the DOS-based versions of Windows, the coordinates you pass to GDI functions are *logical coordinates*. These are mapped to *device coordinates*, which are pixels relative to the upper-left corner of the program's client area. Here's a brief review:

The mapping from logical coordinates to device coordinates is sometimes called the *window/viewport transform*. These are terms from traditional computer graphics; don't confuse window used in this context with the window you display on the screen. Both the window and the viewport have horizontal and vertical extents and an origin that define the transform. The window extents and origin are specified in logical coordinates, and the viewport extents and origin are specified in device coordinates. It is tempting to try to visualize this transform in terms of a window rectangle and a viewport rectangle, but this just doesn't work very well. Instead, the transforms are best approached as mathematical formulas, shown in Figure 1.

The logical point you specify in GDI functions is (x_{window}, y_{window}) . GDI uses the formulas to transform the point to device coordinates $(x_{viewport}, y_{viewport})$.

If the window and viewport origins are both $(0, 0)$, then the transform involves only a scaling factor, which is the ratio of the viewport extents to the window extents. The window and viewport origins introduce a translation factor. The logical point (x_{winorg}, y_{winorg}) maps to the device point $(x_{vieworg}, y_{vieworg})$.

Normally you use the SetMapMode function to change the mapping mode from MM_TEXT (the default) to one of five metric mapping modes: MM_LOENGLISH (one logical unit equals 0.01 inches), MM_HIENGLISH (0.001 inches), MM_LOMETRIC (0.1 millimeters), MM_HIMETRIC (0.01 millimeters), or MM_TWIPS (one logical unit equals a 20th of a printer's point, or $1/1,440$ inches). The SetMapMode function sets the appropriate viewport and window extents for you. For example, for MM_LOENGLISH, GDI sets the viewport and window extents so that the ratio between the two equals the number of pixels in 0.01 inches. In all five of

In a two-dimensional graphics system, such as Windows, a transform is simply a mathematical conversion of a coordinate point (x, y) to a different point (x', y') .

these metric mapping modes, increasing values of y go up the screen, in accordance with traditional analytic geometry.

In addition, the MM_ISOTROPIC and MM_ANISOTROPIC mapping modes allow you to alter the viewport and window extents later to whatever you want using the SetViewportExt and SetWindowExt functions.

(The MM_ISOTROPIC mapping mode causes GDI to make adjustments to these extents so that logical horizontal and vertical units are always the same physical size.) Regardless of the mapping mode, you can always change the viewport and window origins using the SetViewportOrg and SetWindowOrg functions.

The LPtoDP and DPtoLP functions allow you to convert one or more points between logical coordinates and device coordinates.

If this is new to you or you're a little rusty on the topic, you may want to read some of chapter 11 in my book *Programming Windows* (Microsoft Press, 1992).

The Window/Viewport Transform Formulas

$$x_{\text{viewport}} = (x_{\text{window}} - x_{\text{winorg}}) \times \frac{x_{\text{viewext}}}{x_{\text{winext}}} + x_{\text{vieworg}}$$

$$y_{\text{viewport}} = (y_{\text{window}} - y_{\text{winorg}}) \times \frac{y_{\text{viewext}}}{y_{\text{winext}}} + y_{\text{vieworg}}$$

Figure 1: The mapping from logical coordinates to device coordinates is sometimes called the window/viewport transform. These formulas describe that transform.

THE WORLD TRANSFORM Windows NT preserves the window/viewport transform, of course, but also adds an additional transform—the *world transform*. (Again, this term originated in classical computer graphics.)

The points you specify in GDI functions in Windows NT are still called logical coordinates, but they are also referred to as world coordinates in some parts of the NT documentation. Just remember: Logical coordinates are the same as world coordinates. GDI applies the world transform first to convert logical coordinates to *page coordinates*. (This term is new in Windows NT, but it also shows up in the OS/2 Graphics Programming Interface in a similar context.) GDI then applies the window/viewport transform to convert page coordinates to device coordinates (pixels).

The world transform is based on a 3-by-3 matrix, so this type of transform is sometimes called a *matrix transform*. It's also called a *linear transform*, because the transformation formulas involve single powers (not squares or cubes) of the *x* and *y* coordinates.

THE WORLD TRANSFORM ADVANTAGE Why do we need another transform if we've already got one? As we'll see, the world transform is more flexible than the window/viewport transform, which is capable of only two types of transforms:

- **Translation.** This means that the logical point you specify in GDI functions can be offset by a constant value in the conversion to device coordinates. Mathematically, you can represent this as

$$\begin{aligned} x' &= x + x_{\text{offset}} \\ y' &= y + y_{\text{offset}} \end{aligned}$$

The offset value is governed by the window and viewport origins; these can be negative or positive, so the formulas basically involve an addition or subtraction.

- **Scaling.** This means that logical points are increased or decreased with a multiplicative factor in the conversion to

device points, mathematically represented as

$$\begin{aligned} x' &= x \times x_{\text{scale}} \\ y' &= y \times y_{\text{scale}} \end{aligned}$$

In the window/viewport transform, this is governed by the ratio of the viewport extent to the window extent.

If you combine these two types of transforms, the formulas are

$$\begin{aligned} x' &= x \times x_{\text{scale}} + x_{\text{offset}} \\ y' &= y \times y_{\text{scale}} + y_{\text{offset}} \end{aligned}$$

Thus, x' is always a function of x and two constants (x_{scale} and x_{offset}) and y' is always a function of y and two constants (y_{scale} and y_{offset}). The matrix transform formulas let x' be a function of both x and y , and y' be a function of both x and y . This allows two additional types of transforms, known as shear and rotation.

THE XFORM STRUCTURE The world transform in Windows NT is based on a structure named XFORM, defined in the WINGDI.H header file like so:

```
typedef struct tagXFORM
{
    FLOAT eM11 ;
    FLOAT eM12 ;
    FLOAT eM21 ;
    FLOAT eM22 ;
    FLOAT eDx ;
    FLOAT eDy ;
}
XFORM ;
```

First, notice that Windows NT has introduced floating-point numbers to the previously all-integer GDI. The FLOAT

data type is defined as the C float type: a 4-byte, single-precision, floating-point number.

Second, note that the fields of this structure initially seem like a jumble of letters and numbers. The structure fields make sense only when you organize them into the transform matrix

$$\begin{vmatrix} eM11 & eM12 & 0 \\ eM21 & eM22 & 0 \\ eDx & eDy & 1 \end{vmatrix}$$

The *e* prefix indicates these are floating-point numbers. (The *f* prefix has already been used for flags. The *e* stands for exponent.) The *M* in the first four fields stands for matrix, with the numbers representing row and column positions. In the last two fields, the *D* stands for distance; these are scaling factors, as we shall shortly see.

GDI applies this world transform matrix to convert world (or logical) coordinates to page coordinates. If we think of world coordinates as (x, y) and page coordinates as (x', y'), then the world transform is a matrix multiplication:

$$\begin{vmatrix} x & y & 1 \end{vmatrix} \times \begin{vmatrix} eM11 & eM12 & 0 \\ eM21 & eM22 & 0 \\ eDx & eDy & 1 \end{vmatrix} = \begin{vmatrix} x' & y' & 1 \end{vmatrix}$$

If you're a little hazy on matrix multiplications, the transformation formulas are

$$\begin{aligned} x' &= x \times eM11 + y \times eM21 + eDx \\ y' &= x \times eM12 + y \times eM22 + eDy \end{aligned}$$

So we see that *eM11* and *eM22* are scaling factors, and *eDx* and *eDy* are translation factors. The *eM21* and *eM12* factors are what make the world transform more powerful than the window/viewport transform.

By default, the world transform matrix is the identity matrix

$$\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix}$$

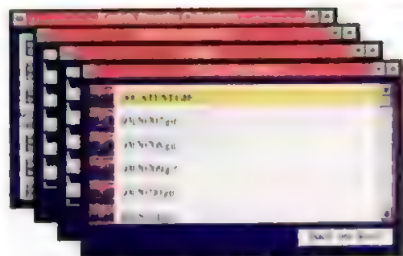
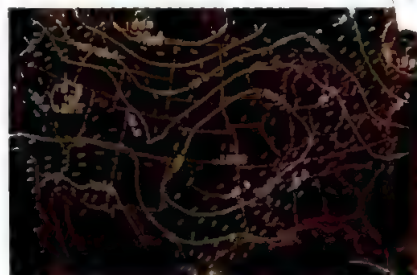
so the transform formulas are

$$\begin{aligned} x' &= x \\ y' &= y \end{aligned}$$

Use The Internet Like A Pro.

Navigating the Internet Just Got Easier with WinGopher

Have you wanted access to the Internet without the hassle of typing complicated addresses or memorizing file locations? Do you lose valuable time wandering through a maze of servers and unwanted files? Now you can organize and simplify your Internet access with WinGopher™, a Microsoft® Windows™-based Gopher client.



View multiple servers at one time.

WinGopher provides you with a graphical interface that uses pull-down menus and point-and-click functionality for easy Internet navigation. Using the Gopher

Requirements for Gopher Clients

Complete Package for Immediate Access

Installation Support

Users' Guide and Online Help

Includes Text & Image Viewers & Telnet

Supports Windows Sound and Video Viewers

Supports Phone Books

Enhanced Bookmarks

Views Multiple Open Servers

Supports Winsock Compatible TCP/IP Stacks

Compatible with Other Windows Applications

WinGopher

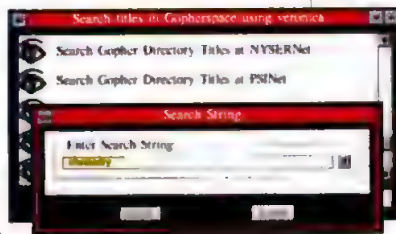
WinGopher Solutions to Meet Your Needs

Whether you need a complete package to begin accessing the Internet, or you are already connecting to the Internet, WinGopher offers you the solution to meet your needs.

WinGopher provides you with a graphical interface to the Internet. It requires: Windows TCP/IP stack software (Winsock 1.1 compatible) and connection; 386 PC or higher with Windows 3.1 and DOS 5.0; 3.5 MB disk space and 2 MB more memory. **\$69.95**

protocol, WinGopher supports Archie, Veronica, and WAIS searching. FTP transactions and Telnet sessions are supported, as well as any Windows sound or video viewer.

An image viewer and text viewer are included with WinGopher.



Pop-up windows for searches.

Now Available - WinGopher Complete provides you with everything you need to start accessing the Internet immediately. Included are WinGopher, a Windows TCP/IP stack software package (Winsock compatible), and an Internet connection through a leading national access provider. With WinGopher Complete, you get 30 free minutes of Internet connect time from a participating access provider. **\$129.00**

Why WinGopher?

WinGopher is a fully supported product, including installation phone support, user documentation, online help, and a bulletin board service. Backed by a leading automation firm, you're not left stranded should you need assistance.

Call 1-800-55-NOTIS

FAX (708) 866-4970 • email: wingopher@notis.com

WinGopher™

GRAPHICAL INTERFACE FOR THE INTERNET

CIRCLE 858 ON READER SERVICE CARD

NTXFORM.C

1 of 2

```

/*-----
NTXFORM.C -- Windows NT Matrix Transforms
(c) Charles Petzold, 1993
-----*/

#include <windows.h>
#include <stdio.h>
#include <math.h>
#include "ntxform.h"

#define TWO_PI (2 * 3.14159)

long APIENTRY WndProc (HWND, UINT, WPARAM, LPARAM) ;
BOOL APIENTRY MatrixBox (HWND, UINT, WPARAM, LPARAM) ;
BOOL APIENTRY AngleBox (HWND, UINT, WPARAM, LPARAM) ;

HANDLE hInst ;

int PASCAL WinMain (HANDLE hInstance, HANDLE hPrevInstance,
                    LPSTR lpzCmdLine, int nCmdShow)
{
    static char szAppName[] = "NtXform" ;
    HWND hwnd ;
    MSG msg ;
    WNDCLASS wndclass ;

    hInst = hInstance ;

    wndclass.style = CS_HREDRAW | CS_VREDRAW ;
    wndclass.lpfnWndProc = WndProc ;
    wndclass.cbClsExtra = 0 ;
    wndclass.cbWndExtra = 0 ;
    wndclass.hInstance = hInstance ;
    wndclass.hIcon = LoadIcon (NULL, IDI_APPLICATION) ;
    wndclass.hCursor = LoadCursor (NULL, IDC_ARROW) ;
    wndclass.hbrBackground = GetStockObject (WHITE_BRUSH) ;
    wndclass.lpszMenuName = szAppName ;
    wndclass.lpszClassName = szAppName ;

    RegisterClass (&wndclass) ;

    hwnd = CreateWindow (szAppName, "Matrix Transforms",
                        WS_OVERLAPPEDWINDOW,
                        CW_USEDEFAULT, CW_USEDEFAULT,
                        CW_USEDEFAULT, CW_USEDEFAULT,
                        NULL, NULL, hInstance, NULL) ;

    ShowWindow (hwnd, nCmdShow) ;
    UpdateWindow (hwnd) ;

    while (GetMessage (&msg, NULL, 0, 0))
    {
        TranslateMessage (&msg) ;
        DispatchMessage (&msg) ;
    }
    return msg.wParam ;
}

long APIENTRY WndProc (HWND hwnd, UINT message, WPARAM wParam, LPARAM lParam)
{
    static int cxClient, cyClient ;
    static LOGFONT logfont ;
    static XFORM xform = { (FLOAT) 1.0, (FLOAT) 0.0,
                           (FLOAT) 0.0, (FLOAT) 1.0,
                           (FLOAT) 0.0, (FLOAT) 0.0 } ;

    HDC hdc ;
    PAINTSTRUCT ps ;

    switch (message)
    {
        case WM_CREATE:
            // initialize LOGFONT structure

            logfont.lfHeight = -1440 ;
            strcpy (logfont.lfFaceName, "Times New Roman") ;

            return 0 ;

        case WM_SIZE:
            cxClient = LOWORD (lParam) ;
            cyClient = HIWORD (lParam) ;

            return 0 ;

        case WM_COMMAND:
            switch (wParam)
            {
                case IDM_SELECT:
                    if (DialogBoxParam (hInst, "MatrixBox", hwnd,
                                        MatrixBox, (LPARAM) &xform))
                        InvalidateRect (hwnd, NULL, TRUE) ;
            }
    }

    break ;
}
return 0 ;

case WM_PAINT:
    hdc = BeginPaint (hwnd, &ps) ;

    // Draw horizontal and vertical lines

    MoveToEx (hdc, 0, cyClient / 2, NULL) ;
    LineTo (hdc, cxClient, cyClient / 2) ;

    MoveToEx (hdc, cxClient / 2, 0, NULL) ;
    LineTo (hdc, cxClient / 2, cyClient) ;

    // Set window/viewport transform

    SetMapMode (hdc, MM_TWIPS) ;
    SetViewportOrgEx (hdc, cxClient / 2, cyClient / 2, NULL) ;

    // Set font and alignment

    SelectObject (hdc, CreateFontIndirect (&logfont)) ;
    SetTextAlign (hdc, TA_BASELINE | TA_LEFT) ;
    SetBkMode (hdc, TRANSPARENT) ;

    // Set world transform

    SetGraphicsMode (hdc, GM_ADVANCED) ;
    SetWorldTransform (hdc, &xform) ;

    // Display text

    TextOut (hdc, 0, 0, "Hello!", 6) ;
}

static LOGBRUSH lb = { BS_SOLID, 0, 0 } ;

SelectObject (hdc, ExtCreatePen (PS_GEOMETRIC | PS_DOT, 144, &lb, 0, NULL)) ;

MoveToEx (hdc, 0, 0, NULL) ;
LineTo (hdc, 2880, 2880) ;
}

// Clean up

DeleteObject (SelectObject (hdc, GetStockObject (SYSTEM_FONT))) ;

EndPaint (hwnd, &ps) ;
return 0 ;

case WM_DESTROY:
    PostQuitMessage (0) ;
    return 0 ;
}
return DefWindowProc (hwnd, message, wParam, lParam) ;
}

BOOL SetDlgItemFloat (HWND hwnd, int idControl, FLOAT eValue)
{
    char szBuffer [32] ;

    sprintf (szBuffer, "%f", eValue) ;

    return SetDlgItemText (hwnd, idControl, szBuffer) ;
}

FLOAT GetDlgItemFloat (HWND hwnd, int idControl)
{
    char szBuffer [32] ;

    GetDlgItemText (hwnd, idControl, szBuffer, 32) ;

    return (FLOAT) atof (szBuffer) ;
}

BOOL APIENTRY MatrixBox (HWND hwnd, UINT message, WPARAM wParam, LPARAM lParam)
{
    static PXFORM pxform ;

    switch (message)
    {
        case WM_INITDIALOG:
            pxform = (PXFORM) lParam ;

            SetDlgItemFloat (hwnd, IDD_EM11, pxform->eM11) ;
            SetDlgItemFloat (hwnd, IDD_EM12, pxform->eM12) ;
            SetDlgItemFloat (hwnd, IDD_EM21, pxform->eM21) ;
            SetDlgItemFloat (hwnd, IDD_EM22, pxform->eM22) ;
            SetDlgItemFloat (hwnd, IDD_EDX, pxform->eDx) ;
            SetDlgItemFloat (hwnd, IDD_EDY, pxform->eDy) ;
    }
}

```



Figure 2: The NTXFORM.C file contains all the source code for the program.

NEW
LOWER PRICES!

*You want the features of a
laser printer.*

*You require the output size
of a large format plotter.*

What you need is the new ProTracer II.

It's small enough to sit on your desktop. At 360 dpi, it prints crisp text, precise lines and the smoothest of curves. Its speed is undeniable. And its price — unheard of in the world of CAD.

Called ProTracer™ II, it's a large format inkjet plotter that brings something new to CAD. Versatility. Because not only does ProTracer II produce impressive drawings up to 17"x 22" in size, but it also delivers sharp, high quality text documents.

ProTracer II has an abundance of new features and capabilities all aimed at making you more productive. Like its speed enhancements. And its expanded plotting capabilities including a larger printable area, auto-centering, best fit, replot, and long axis plotting functions.

If you're an AutoCAD® user you'll want the ProTracer II base unit, priced at \$1499. It comes with ADI® drivers for AutoCAD as well as an AutoCAD 12 for Windows driver. Also included is a C-size Windows 3.1 driver and IBM ProPrinter and Epson emulations.

Our new ProTracer II-GL model combines the base unit with resident HP-GL® and HP-GL/2 emulations, and 2 MB memory. It provides support for all major CAD applications and is priced at only \$1999.

ProTracer II is backed by a full one year warranty and optional extended warranties. You'll also receive unlimited access to our expert technical support.

To receive your FREE sample output packet, locate a dealer near you, or to order direct, call Pacific Data Products at (619) 625-3642, Fax (619) 552-0889.



NTXFORM.C

2 of 2

```

return TRUE ;

case WM_COMMAND:
    switch (wParam)
    {
        case IDD_ANGLE:
            if (DialogBoxParam (hInst, "AngleBox", hwnd,
                                AngleBox, (LPARAM) pxform))
            {
                SetDlgItemFloat (hwnd, IDD_EM11, pxform->eM11) ;
                SetDlgItemFloat (hwnd, IDD_EM12, pxform->eM12) ;
                SetDlgItemFloat (hwnd, IDD_EM21, pxform->eM21) ;
                SetDlgItemFloat (hwnd, IDD_EM22, pxform->eM22) ;
            }

            return TRUE ;

        case IDOK:
            pxform->eM11 = GetDlgItemFloat (hwnd, IDD_EM11) ;
            pxform->eM12 = GetDlgItemFloat (hwnd, IDD_EM12) ;
            pxform->eM21 = GetDlgItemFloat (hwnd, IDD_EM21) ;
            pxform->eM22 = GetDlgItemFloat (hwnd, IDD_EM22) ;
            pxform->eDx = GetDlgItemFloat (hwnd, IDD_EDX) ;
            pxform->eDy = GetDlgItemFloat (hwnd, IDD_EDY) ;

            EndDialog (hwnd, TRUE) ;
            return TRUE ;

        case IDCANCEL:
            EndDialog (hwnd, FALSE) ;
            return TRUE ;
    }
    break ;
}
return FALSE ;
}

BOOL APIENTRY AngleBox (HWND hwnd, UINT message, WPARAM wParam, LPARAM lParam)
{
    static FLOAT eAngle = (FLOAT) 0.0, eScale = (FLOAT) 1.0 ;
    static PXFORM pxform ;

```

```

switch (message)
{
    case WM_INITDIALOG:
        pxform = (PXFORM) lParam ;

        SetDlgItemFloat (hwnd, IDD_ANGLE, eAngle) ;
        SetDlgItemFloat (hwnd, IDD_SCALE, eScale) ;

        return TRUE ;

    case WM_COMMAND:
        switch (wParam)
        {
            case IDOK:
                eAngle = GetDlgItemFloat (hwnd, IDD_ANGLE) ;
                eScale = GetDlgItemFloat (hwnd, IDD_SCALE) ;

                pxform->eM11 = (FLOAT) (eScale *
                                         cos (TWO_PI * eAngle / 360)) ;

                pxform->eM12 = (FLOAT) (eScale *
                                         sin (TWO_PI * eAngle / 360)) ;

                pxform->eM21 = -pxform->eM12 ;
                pxform->eM22 = pxform->eM11 ;

                EndDialog (hwnd, TRUE) ;
                return TRUE ;

            case IDCANCEL:
                EndDialog (hwnd, FALSE) ;
                return TRUE ;
        }
        break ;
}
return FALSE ;
}

```

You can set the world transform using `SetWorldTransform` and obtain the current one using `GetWorldTransform`. Both these functions have two parameters: the device context handle and a pointer to an `XFORM` structure.

THE NT TRANSFORM PROGRAM To familiarize yourself with how matrix transforms work, you can use the `NTXFORM` program, shown in Figure 2. The program displays a dialog box that lets you type in values for the six fields of the `XFORM` structure. These affect the display of some text in the program's client area.

During the `WM_PAINT` message, the `NTXFORM` program first displays two lines, one down the center and one across the center of the client area. It then sets the mapping mode to `MM_TWIPS`, which means that logical units are 1/1440 inch and that increasing values of *y* go up the screen. The origin—the device coordinate corresponding to the logical coordinate (0, 0)—is set to the center of the client area.

`NTXFORM` then selects a Times New Roman TrueType font into the device context. The height of this font is -1440 units, which indicates a size of 72 points,

or 1 inch. The program uses the `SetTextAlign` function to display text so that the point specified in the `TextOut` function corresponds to the baseline of the left side of the text string.

The program then calls `SetGraphicsMode` with the `GM_ADVANCED` parameter. This is a necessary preliminary to using the world transform. It then calls `SetWorldTransform` with an `XFORM` structure initialized with the identity matrix and displays the text string "Hello!" The results are shown in screenshot A in the sidebar "NTXFORM's Displays".

THE TRANSLATION TRANSFORM If you invoke the dialog box and set the `eDx` and `eDy` fields of the `XFORM` structure, you can move the text string to another part of the client area. These are the translation factors. With `eM11` and `eM22` still set to 1.0, the transform formulas are

$$\begin{aligned} x' &= x + eDx \\ y' &= y + eDy \end{aligned}$$

In the `NTXFORM` program, you must specify the translation factors in units of 1/1440 inch. Also recall that increasing val-

ues of *y* go up the screen. For example, if you set `eDx` to -1440 and `eDy` to -2880, the text string is shifted 1 inch to the left and 2 inches down, as shown in screenshot B.

THE SCALING TRANSFORM The `eM11` and `eM22` fields of the `XFORM` structure are scaling factors. By default these are 1. You can increase them to make graphics objects larger or decrease them to make graphics objects smaller. Keeping everything else at their default values, the transform formulas are

$$\begin{aligned} x' &= x \times eM11 \\ y' &= y \times eM22 \end{aligned}$$

For example, if you set `eM11` to 0.5 and `eM22` to 4.0, then the text string will be compressed by half in the *x* direction and stretched by a factor of 4 in the *y* direction, as shown in screenshot C.

You can also use negative values of `eM11` and `eM22`. In such cases, graphics objects are flipped around the horizontal or vertical axis. This is sometimes called reflection. For example, screenshot D shows the results of using -2.0 for both `eM11` and `eM22`.

The Award-Winning Performance Of Macola Accounting Software

“ ”



October 26, 1993
Version 6.0



October 15, 1991
Version 5.0



September 26, 1989
Version 4.0



September 15, 1987
Version 3.0

Coming To A Screen Near You.



- ☆ Award-winning performance and data integrity.
- ☆ Support for DOS, LANs, Windows and UNIX.
- ☆ Macola adheres to standards like Micro Focus COBOL, C++ and offers a path to move to client/server technologies.
- ☆ Source code is available for customization.
- ☆ Superior technical support available through local reseller or direct from Macola.
- ☆ Highly integrated accounting, distribution and manufacturing software modules starting at \$995 per module.

*Put Macola Software through your own screen test.
Call or write for our free self-running demo.*

MACOLA
SOFTWARE

Accounting Software You'll Never Outgrow.

Free Self-Running Demo. Call Us, Fax Us, Write Us!

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Bus. Phone _____ Fax _____

Current Software _____

☐ Please check for personal demo.

Macola Incorporated

333 East Center Street, Marion, Ohio 43302
1-800-468-0834 ext.550 FAX: 1-614-382-0239

POWERFUL 486 PROCESSOR

UP TO 6-HR. OPTIONAL BATTERY

INSTANT-ON FEATURE

OPTIONAL DOCKING BASE

ABOUT 3.5 POUNDS'

OPTIONAL PCMCIA FLOPPY DRIVE

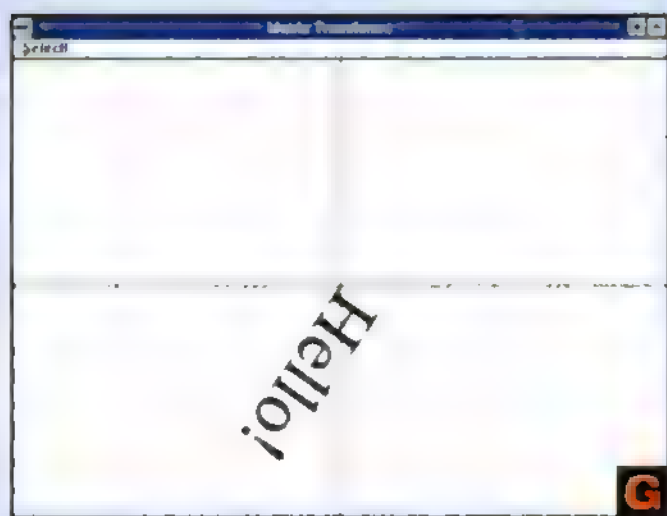
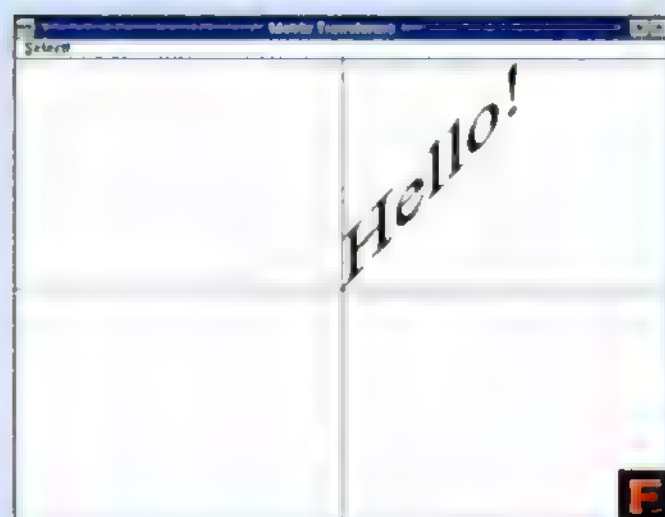
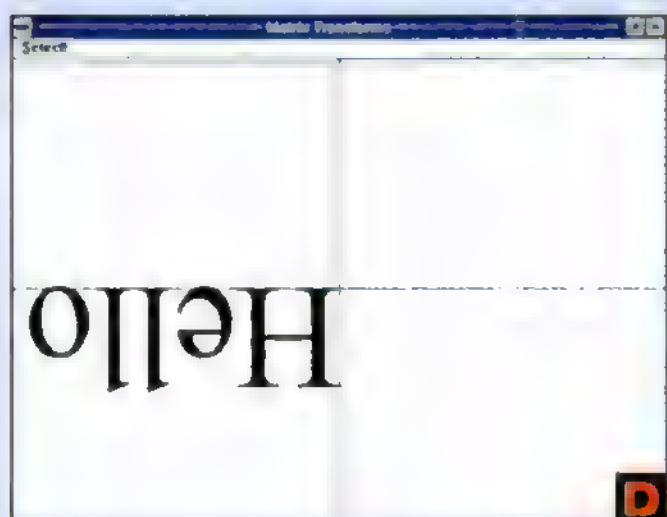
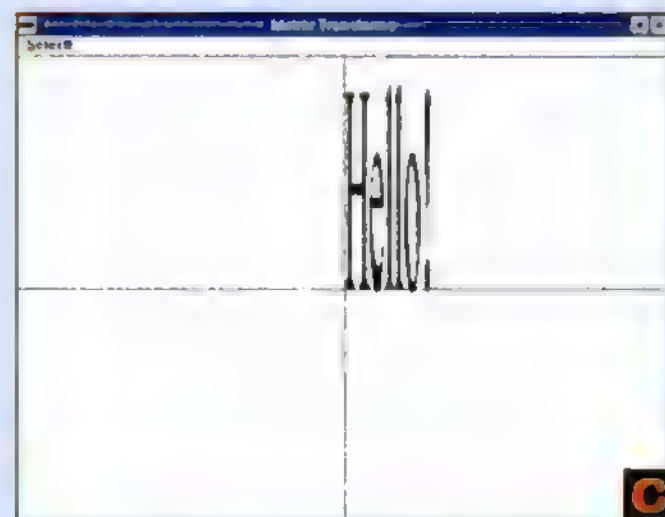
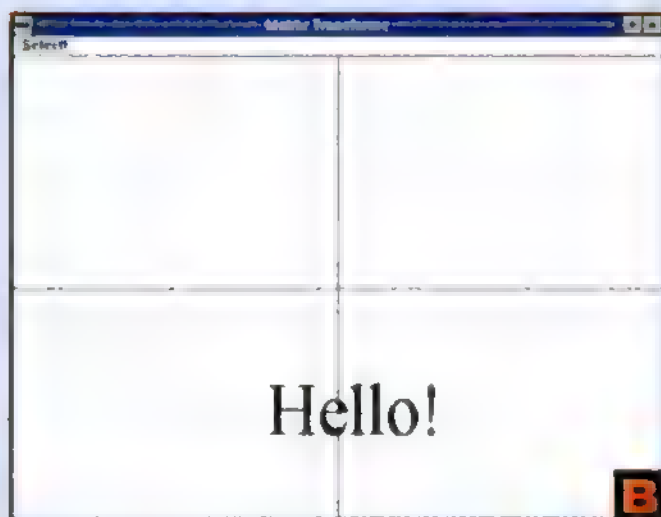
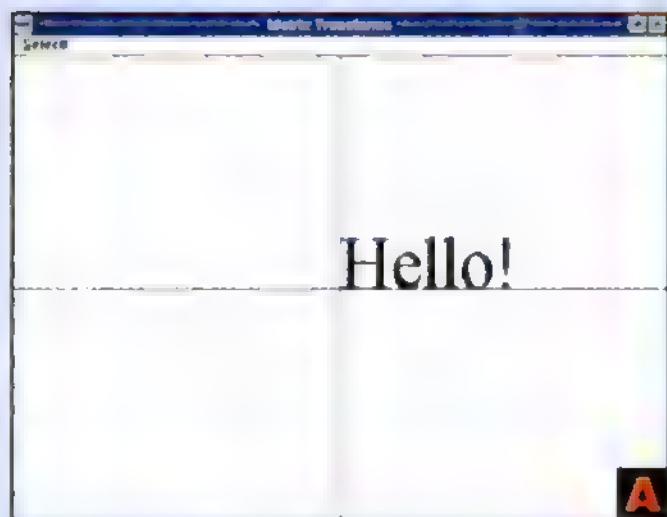
FREE 3-YEAR WARRANTY*

MONOCHROME FROM \$1,399*

COMPAQ

© 1994 Compaq Computer Corporation. All rights reserved. Compaq, Contura Registered U.S. Patent and Trademark office. Aero is a trademark of Compaq Computer Corporation.
For information via fax on our limited warranty, consult the Compaq Customer Support Center at 1-800-345-1518, select the PageFax option and request document number

NTXFORM's Displays



The initial display of the NTXFORM program (A). The demonstration of translation in the NTXFORM program (B). The demonstration of scaling in the NTXFORM program (C). The demonstration of negative scaling in the NTXFORM program (D). The demonstration of x-shear in the NTXFORM program (E). The demonstration of y-shear in the NTXFORM program (F). The demonstration of rotation in the NTXFORM program (G).

THE SHEAR TRANSFORM What makes the world transform different from the window/viewport transform is that x' is a function of y as well as x , and y' is a function of x as well as y . This makes possible a type of transform known as shear (or skew). For example, if you set the eM21 field equal to 1, then the transform formulas are

$$\begin{aligned}x' &= x + y \\ y' &= y\end{aligned}$$

This means that the x' coordinate is increased by a translation factor equal to y .

For increasing values of y , x' gets larger also. This causes graphics objects to slant to the right, as shown in screenshot E in the sidebar. Negative values of eM21 would cause a slant to the left.

You can shear images up and down using the eM12 factor. If eM12 is equal to 1.0, the transform formulas become

$$\begin{aligned}x' &= x \\ y' &= x + y\end{aligned}$$

The results are shown in screenshot F. **THE ROTATION TRANSFORM** If you think about it for a little while, the prop-

er combination of x-shear and y-shear effectively rotates a graphics object without distortion. In traditional analytic geometry, angles of rotation are specified in degrees counterclockwise from the horizontal axis.

For an angle α , the transform matrix for rotation is

$$\begin{vmatrix} \cos(\alpha) & \sin(\alpha) & 0 \\ -\sin(\alpha) & \cos(\alpha) & 0 \\ 0 & 0 & 1 \end{vmatrix}$$

For purposes of experimenting with rotation, the main dialog box in NTX-

FORM has a button labeled Angle that invokes another dialog box for setting both an angle of rotation and a scaling factor. For example, setting an angle of 235 degrees and a scaling factor of 1.0 gives you a display that looks like the one in screenshot G. Rotation opens up Windows NT to graphics effects that would otherwise be difficult. For example, the Ellipse function normally draws an ellipse with axes parallel to the vertical and horizontal axes. To draw an ellipse with oblique axes in the DOS-based version of Windows, you'd have to use the Polyline function and your own ellipse formulas. Under Windows NT, it's simply a matter of setting the world transform for rotation and then drawing an ellipse.

MORE ON MATRICES I mentioned earlier that the matrix transform is also called a linear transform because it involves only single powers of the x and y coordinates. This implies that parallelograms are always transformed to parallelograms and ellipses are always transformed to ellipses.

There's a good reason why matrices are

used to represent the transform: The combination of two or more transforms, one after another, is equivalent to a matrix multiplication, and the mechanics of matrix multiplication are well known. You don't have to write code to perform this multipli-

*The Rotation transform
opens up Windows NT to
graphics effects that would
otherwise be difficult.*

cation yourself. The ModifyWorldTransform function will do it for you:

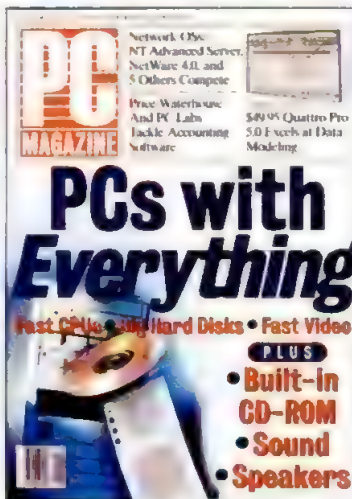
```
ModifyWorldTransform (hdc, &xform,  
iMode) ;
```

The existing world transform matrix is multiplied by the matrix passed to the function. Because matrix multiplication is not commutative, the iMode parameter

can be either MWT_LEFTMULTIPLY or MWT_RIGHTMULTIPLY. In the former case, the xform structure in the function is the left multiplicand, and in the latter case, xform is the right multiplicand. The MWT_IDENTITY parameter returns the world transform to the default value, in which case the second parameter is ignored. The CombineTransform function also multiplies two matrices independent of a device context.

Most graphics objects are affected by the world transform, although some are not. Raster fonts may be stretched or compressed (within limits), but they can not be sheared or rotated. Fill patterns are not affected in any way by the world transform, and neither are the widths and styles of cosmetic pens. The display of bitmaps, however, are affected by the world transform. This is one advantage of NT over OS/2 2.1, which cannot rotate or shear bitmaps.

In the next issue, we'll see how the world transform can get us into trouble when selecting fonts and how to avoid such problems. □



PC MAGAZINE

Network Ops:
NT Advanced Server,
NetWare 4.11, and
S Others Complete

Price Waterhouse
And PC Labs
Tackle Accounting
Software

\$49.95 Quattro Pro
5.0 Excel at Data
Modeling

PCs with Everything

Fast CPU's • Hard Disks • Fast Video

PLUS

- Built-in CD-ROM
- Sound
- Speakers

ONE YEAR

22 issues for \$29.97.
YOU SAVE 54%!

TWO YEARS

44 issues for \$49.97.
YOU SAVE 62%!

Call toll-free today:
1-800-289-0429

INSIDER'S PRICE

FOR OUR READERS — SUBSCRIBE & SAVE

Plus a Bonus!
3 Disks with 146
utilities **FREE** with
your paid order.



ANNUAL COVER PRICE	REGULAR SUBSCRIPTION PRICE	YOUR PROFESSIONAL RATE	BONUS STATUS
\$64.00	\$44.97	\$29.97	3 FREE DISKS

Subscribe now, and get 22 issues for only \$29.97 — that's 54% off the annual cover price! Better yet, sign up for two years and get 44 issues for just \$49.97 — a savings of 62%!

Along with your order you'll also get PC Magazine's "Utilities Library" on 3 disks — **FREE** with your paid subscription! These 146 DOS and Windows™ utilities, selected especially for new subscribers by PC Magazine's editors, let you upgrade your system, boost your PC power, and simplify tasks — all at the touch of a key! This exclusive software is available only to new subscribers!

Canada and foreign add \$36.00 per year. U.S. funds only. Canadian GST included. Please allow 30 days for shipment of first issue. FREE disks will be sent upon payment.

It's a Jungle Out There... May the Fittest Survive.

MAG INNOVISION DX17F

*Microprocessor-based, digitally controlled
17-inch color monitor*



MSRP \$799

THIS MONITOR HAS A LOT OF CONCERN FOR THE ENVIRONMENT (GREEN ENERGY-EPA ENERGY STAR, VESA DPMS, NO CFC, SWEDAC MPR II).

THIS MONITOR HAS A LOT OF DISPLAY AREA (11.8 SQUARE INCHES).

AND THIS MONITOR HAS A 0.26MM DOT PITCH, AND A 1280 X 1024 MAXIMUM RESOLUTION.

WHICH MEANS WHILE THIS MONITOR HAS ENORMOUS RESPECT FOR YOUR WALLET.

THAT'S WHY THIS MONITOR SHOULD ALSO APPEAL TO YOUR SENSE OF RESPONSIBILITY AND VALUE.

SO CALL US AT 1-800-827-3996 (1-714-751-2008 IN CA) FOR MORE INFORMATION ON THIS MONITOR.

NEC 4FG6

*Microprocessor-based, digitally controlled
15-inch color monitor*



MSRP \$799

THIS MONITOR HAS IT, TOO. (EPA ENERGY STAR, VESA DPMS, SWEDAC MPR II).

THIS MONITOR HAS A LOT LESS (2.7 SQUARE INCHES LESS).

THIS MONITOR HAS NEITHER.

THIS MONITOR DOES NOT.

AND THIS MONITOR SHOULD NOT.



CIRCLE 067 ON READER SERVICE CARD

Power Programming

BY MARK FLORENCE

Bring Programs To Life with Digital Video

It was spring 1992 when I had the opportunity to hear John Sculley, then of Apple Computer, deliver the keynote address at the annual Technical, Entertainment, and Design (TED) conference in Monterey, California. The conference was an experience as far removed from Comdex as you're likely to see: no "Hello, My Name Is..." name tags; pony tails and earrings were de rigueur—and that was just for the men! The conference participants were an eclectic assembly of Hollywood producers, authors, and digital-video programmers.

Mr. Sculley opined that entertainment and computing would fuse in the coming decade. We programmers weren't amused; after all, who could forget the decade-long Year of the LAN? The really exciting news, however, is that it now looks as if he was right.

Way ahead of traditional business-application developers, the entertainment industry has taken the lead with digital video. In this column, you'll see some of the programming paradigms that will lead us into the video-laden 21st century. You'll learn about programs driving today's best-selling CD-ROM titles, such as Media Vision's Critical Path interactive game. You'll explore the emerging standards that promise to define digital video all the way from your desktop computer to living-room interactive TV. Best of all, you can start writing imaginative digital video programs now.

First, I have to reveal a personal prejudice about terminology. Many authors use

the term *multimedia* where I have chosen the more restrictive *digital video*. This article might have been called "Multimedia Programming." In part, I use this term because I feel that advertising copywriters have devalued the term beyond utility (what programmer does not wince at the now ubiquitous references to anything "object-oriented"?). Mainly, however, the phrase digital video in this context is more accurate: We'll focus on the programming problems that arise when traditional analog video (and its associated audio) is digitized and then played back.

THE STANDARDS

For developers of digital-video Windows programs, two core standards have emerged: QuickTime from Apple Computer and Microsoft Video for Windows. (For further discussion of these two video standards, see the March 29, 1994, Corporate Developer column.)

Both Apple and Microsoft have not only established programming standards but also digital-video file-format standards. Apple calls its file format QuickTime (the same name it uses for its API), and Microsoft uses the term *AVI*, for Audio-Video Interleave. While similar in concept, each is quite different in implementation.

There is a third dimension to the Apple and Microsoft standards. Within Quick-

Time or *AVI* files, video frames and their associated sound data are compressed—*encoded* in the digital-video argot. Video files are compressed for two reasons. First, it's necessary to reduce the size of the file. The calculations showing that uncompressed digital-video files are vast beyond practicality may be familiar to you by now. If not, note that approximately 30MB per second of video is required. If you're tempted to anticipate a time when disk space is abundant and cheap, you must confront the second reason for compression: to sharply reduce bandwidth requirements. Even if you had the 180 gigabytes necessary to hold *Terminator 2*, your disk, bus, and video subsystems couldn't possibly perform at the required data-transfer rate of 30MB per second.

Both QuickTime and Video for Windows allow arbitrary new encodings to be added without affecting existing programs or requiring extensions to the file format. However, not all encodings are created equal. Some are proprietary to either Apple or Microsoft and in practice are available only on their respective plat-

In this column, you'll see some of the different programming paradigms that will lead us into the video-laden 21st century.

forms. Fortunately, the best (Cinepak, from SuperMac, and Indeo, from Intel, are among them) are available for both platforms. I like to visualize the file formats as wrappers: When peeled away, the remaining frames and sound are no longer tied to either QuickTime or *AVI*, just to their encoding.

Recently, the Motion Picture Experts Group (MPEG) standard has become extremely important. It was defined not by a software vendor but by the International Standards Organization (ISO) itself. This standard defines both a file format and an encoding but not a programming interface. Consequently, we should expect both QuickTime and Video for Windows to support MPEG in the near future.

There are currently two significant manifestations of the MPEG standard. Interactive TV (for which pilot programs are running in certain places around the country) uses MPEG as its encoding. On

the desktop, MPEG playback cards, such as Sigma Designs' ReelMagic, are just starting to hit the market.

This last point raises an interesting fact. Most digital-video encodings are designed so that special hardware is not required for playback. For this reason, most titles, such as Critical Path (which uses Cinepak), can be played on almost any modern PC. MPEG is quite different, however. Its encoding is so complex and efficient that hardware assistance is in my opinion mandatory, with apologies to some interesting software-only decompressors.

This requirement is both a blessing and a curse. While users must buy and install new hardware, full-screen video—impressive and true full-motion—is the reward. In the coming year, we should expect to see several new MPEG boards and a flood of CD-ROM titles specially designed to take advantage of them.

CHOOSING A STANDARD As a digital-video programmer, you will have to choose among these standards. In some cases, you may have sufficient control of the project to determine all three aspects: the API, the file format, and the video and sound encodings. For example, imagine that you have been assigned to write a Windows program that would allow Francis Ford Coppola to view his daily rushes digitally. You have the freedom to choose the best combination for your application. By contrast, the developers of Adobe's Premiere (digital-video editing software) were more constrained, because they had to support both the QuickTime and the .AVI file formats and a wide range of encodings.

The many parameters for making this choice are beyond the scope of this article. But by illustrating programs and coding techniques for both QuickTime and

Video for Windows, I'll give you some hints. Here's one from my personal experience: In the entertainment world, Mac and PC cross-platform compatibility is extremely important. Although 640MB may seem like a lot of space on a CD-ROM, it's not if you have to duplicate your content in both QuickTime and AVI format. A big benefit of QuickTime is that its API is mostly portable between the Mac and Windows, and its file format is completely portable. In other words, if you want Mac-to-PC compatibility, go with QuickTime or risk getting only half as much video on the CD-ROM.

AVAILABLE PROGRAMMING TOOLS Before we look at some code, let's take a quick survey of the available tools. At the highest level, you'll find scripting tools, such as MacroMind's Director and Apple's Media Toolkit, and you can create stunning results with these tools. You

A QuickTime for Windows Movie Player

Complete Listing

```
#include <windows.h>
#include <qtwh.h>

MovieFile mfMovie;
RECT rcMovie;
Movie mMovie;
MovieController mcController;

long FAR PASCAL __export WndProc (HWND hwnd, UINT message,
WPARAM wParam, LPARAM lParam) {

    PAINTSTRUCT ps;

    // Drive the movie controller
    if (MCIsPlayerMessage (mcController, hwnd, message,
wParam, lParam))
        return 0;

    // Process the windows message
    switch (message) {
        case WM_PAINT:
            if (!BeginPaint (hwnd, &ps))
                return 0;
            EndPaint (hwnd, &ps);
            return 0;
        case WM_DESTROY:
            PostQuitMessage (0);
            return 0;
    }

    // Return to Windows
    return DefWindowProc (hwnd, message, wParam, lParam);
}

int PASCAL WinMain (HINSTANCE hInstance, HINSTANCE hPrev,
LPSTR lpszCmd, int nCmdShow) {

    HWND hwnd;
    MSG msg;
    WNDCLASS wndclass;

    static char szAppName[] = "QuickTime API";

    // Initialize QuickTime
    QTInitialize (NULL);
    EnterMovies ();

    // Register and create main window
    if (!hPrev) {
        wndclass.style = CS_DBLCLKS | CS_HREDRAW | CS_VREDRAW;
        wndclass.lpfnWndProc = WndProc;

        wndclass.cbClsExtra = 0;
        wndclass.cbWndExtra = 0;
        wndclass.hInstance = hInstance;
        wndclass.hIcon = LoadIcon (NULL, IDI_APPLICATION);
        wndclass.hCursor = LoadCursor (NULL, IDC_ARROW);
        wndclass.hbrBackground = (HBRUSH) (COLOR_WINDOW + 1);
        wndclass.lpszMenuName = NULL;
        wndclass.lpszClassName = szAppName;
        RegisterClass (&wndclass);
    }

    hwnd = CreateWindow (szAppName, szAppName,
WS_CAPTION | WS_SYSMENU |
WS_CLIPCHILDREN | WS_OVERLAPPED, CW_USEDEFAULT, CW_USEDEFAULT,
CW_USEDEFAULT, CW_USEDEFAULT, NULL, NULL, hInstance, NULL);

    // Instantiate the movie and its controller
    OpenMovieFile ("SAMPLE.MOV", &mfMovie, OF_READ);
    NewMovieFromFile (&mMovie, mfMovie, NULL, NULL,
newMovieActive, NULL);
    CloseMovieFile (mfMovie);
    GetMovieBox (mMovie, &rcMovie);
    OffsetRect (&rcMovie, -rcMovie.left, -rcMovie.top);
    mcController = NewMovieController (mMovie, &rcMovie,
mcTopLeftMovie + mcScaleMovieToFit, hwnd);

    // Make the frame just big enough for the movie
    MCGetControllerBoundsRect (mcController, &rcMovie);
    AdjustWindowRect (&rcMovie, WS_CAPTION | WS_OVERLAPPED, FALSE);
    OffsetRect (&rcMovie, -rcMovie.left, -rcMovie.top);
    SetWindowPos (hwnd, 0, 0, 0, rcMovie.right,
rcMovie.bottom, SWP_NOMOVE | SWP_NOZORDER);
    ShowWindow (hwnd, nCmdShow);
    UpdateWindow (hwnd);

    // Play the movie
    while (GetMessage (&msg, NULL, 0, 0)) {
        TranslateMessage (&msg);
        DispatchMessage (&msg);
    }

    // Clean up
    DisposeMovieController (mcController);
    DisposeMovie (mMovie);
    ExitMovies ();
    QTTerminate ();

    // Return to Windows
    return msg.wParam;
}
```

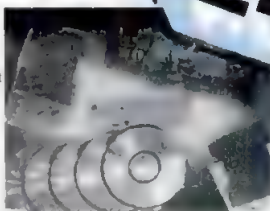


Figure 1: This simple Windows program written to the QuickTime API illustrates three of the most basic concepts in QuickTime programming: movies, movie controllers, and movie scheduling. An example of its output is shown in Figure 2.

MAY MULTIMEDIA MADNESS SALE!

M.V. RESOURCE MULTIMEDIA KIT

- A perfect starter multimedia upgrade kit
- Great 16-bit sound card
- Double-speed CD-ROM drive
- Amplified speakers



- Includes 5 exciting software titles: Brittle Chess, Where in the World is Carmen Sandiego, Greens, 11" and Railroad Tycoon.

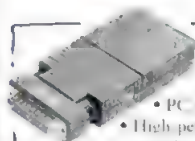
ONLY \$249



MULTIMEDIA BUYER'S CLUB

When you make a purchase from Media Vision Resource ask about becoming a member of the Multimedia Buyer's Club and receive a FREE CORFI CD-ROM.

AUDIO PORT

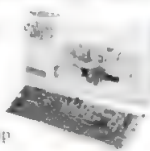


- PC audio device
- High performance portable module for PCs & notebooks
- Plugs into parallel port of any IBM PC/AT, PS/2 or notebook
- Transport Sound™ technology & built-in speaker
- Headphone & external speaker outputs

\$65

PRO MOVIESPECTRUM

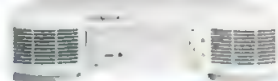
- Create professional desktop videos on your PC
- Smooth real-time capture at 30 frames per second up to 1600 x 1200
- Still frame capture with resolutions of 320 x 240 & 640 x 480
- 32,768 vibrant colors
- Includes Microsoft Video for Windows



\$99

Add CDPC Bass Enhancement for only \$65!

- The first complete, fully integrated, multi-media solution
- Includes full-speed CD-ROM drive, amplified speakers & MIDI
- Multi-session PhotoCD ready
- Brings high-fidelity sound to your PC with the best in 16-bit digital audio
- Includes 5 software titles: Where in the World is Carmen Sandiego, Action, Compton's Multimedia Encyclopedia, Brittle Chess, and Dinosaur Adventure



CDPC XL

ONLY \$399

- Order instantly from experienced multimedia sales representatives
- 30-day money back guarantee on hardware products only

- Toll-free technical support 7 days a week
- Overnight delivery available
- All major credit cards accepted

Ask about other great multimedia products available through Media Vision Resource

PAS LC PAS NuBus \$99

PRO AUDIOSPECTRUM 16 FOR THE MAC

- The ultimate in affordable sound upgrades
- True 16-bit sampling & playback, 4-channel input mixer, MIDI and headphones
- Easy installation
- Includes Interplay's Out of This World



Call 1-800-684-6699

Monday thru Saturday, 6am to 6pm PST
International customers call (510) 770-8600



MEDIA VISION RESOURCE

may not yet have seen *The Resident's Freakshow*, from *Voyager*, but when you do, it's worth a look. *Freakshow*, which was two years in the making, uses Director to maximum effect. In it, you tour a fantastic circus tent and if you can find the way, sneak backstage. Using innovative techniques, *Freakshow* packs more than 9 hours of video, sound, and animation onto a single CD-ROM.

No matter how impressive, this is hardly the stuff *Power Programming* columns are made of. To program to the metal, we'll have to explore two low-level interfaces: Microsoft's MCI (Media Control Interface) and Apple's QuickTime API.

MCI is a protocol layer designed for programs to communicate in a uniform fashion with a variety of disparate multimedia features, including digital video. Others are CD-DAs, laserdisks, professional-grade VCRs, .WAV files, and Autodesk animations. Both QuickTime and Video for Windows implement MCI drivers that respond to the same standard protocol, so you can write code that will work in both systems. MCI is accessible through almost all programming languages, from Asymetrix Toolbox to Microsoft Visual Basic to C and C++. Normally, such programs prepare command strings (ASCII strings) for MCI to interpret and execute. With low-level languages that can handle pointers, such as C and C++, an alternative, message-based interface is also available that offers greater flexibility and convenience. Because this interface takes a pointer to a data structure and passes it to Windows, however, it's not suitable for use in all languages.

Although you can program QuickTime through MCI, C and C++ programs can also communicate with QuickTime directly through its API, derived almost intact from its big brother on the Mac. The three advantages to this approach are the easier migration from existing Mac programs, maximum performance, and the added control, as you'll see later when we explore palettes. The disadvantage is that your system becomes committed to the QuickTime file format. While the QuickTime API can be used to playback .AVI files, it cannot do so with optimum performance if those files reside on CD-ROM.

If you're using a low-level language for digital-video programming, there are sev-

eral strong reasons to prefer C and C++. First, many powerful development tools are based on the C language. I include in my personal list of favorites Microsoft Visual C++ 1.5, Borland C++ 4.0, and Symantec C++ Professional 6.1 (whose cousin on the Mac is my favorite). These tools all supply bindings to the complete Windows API.

If you want to use the QuickTime API, you must use C or C++ for two reasons. First, QuickTime uses the `_cdecl` calling convention (although some other lan-



Figure 2: The simple QuickTime program in Figure 1 opens this movie (*SAMPLE.MOV*) and prepares it for playback. Note the VCR-like controls at the bottom of the window to play, pause, and stop the movie.

guages can handle this). Second, Apple supplies and supports only C bindings to the QuickTime API. So if you really must code in Pascal, you'll have to roll your own include files.

THE QUICKTIME API Figure 1 shows a very simple Windows program written to the QuickTime API. To save space, it eliminates most error checking, and even then, most of the code deals with the standard Windows infrastructure, which should be very familiar. It opens and plays a movie (*SAMPLE.MOV*); example output is shown in Figure 2. Simple though it is, it illustrates three of the most basic concepts in QuickTime programming: movies, movie controllers, and movie scheduling.

Your program performs some stan-

dard operations on a movie, the most important of which is instantiation. Movies most commonly exist in files. This fragment of code from Figure 1 instantiates a movie from the *SAMPLE.MOV* file:

```
OpenMovieFile ("SAMPLE.MOV",
    &mfMovie, OF_READ);
NewMovieFromFile (&mMovie, mfMovie,
    NULL, NULL, newMovieActive, NULL);
CloseMovieFile (mfMovie);
```

It's also possible (but not usual) for a movie to exist as a program resource or as a part of another file.

Movies don't generally take life until they are associated with a movie controller. In the full QuickTime API as implemented on the Mac, movies can be played without the aid of a movie controller. Use of a controller greatly simplifies the programming, however, and is the only method available under Windows. Movie controllers operate on one movie at a time. In this example, we'll create a movie controller specifically for the one movie we want to play. It's possible, however, to disassociate a movie from its controller and associate a new movie with the controller, a process that you might find useful.

In the following code fragment, we create a new movie controller and immediately associate it with the *SAMPLE.MOV* movie. Because movie controllers always exist in the context of a window, you must also specify a window handle.

```
GetMovieBox (mMovie, &rcMovie);
OffsetRect (&rcMovie, -rcMovie.left,
    -rcMovie.top);
mcController = NewMovieController
    (mMovie, &rcMovie, mcTopLeftMovie
    + mcScaleMovieToFit, hWnd);
```

In addition to providing programming services for movies (as API functions your program can call), the movie controller also provides an optional VCR-like user interface to start, pause, or stop the movie. This user interface is visible by default. To make it invisible, you should use the `mcNotVisible` parameter:

```
mcController = NewMovieController
    (mMovie, &rcMovie, mcTopLeftMovie
    + mcScaleMovieToFit
    + mcNotVisible, hWnd);
```


THE NEW **WORKPLACE**™

[**Sharp PC-8650** LCD Color **Notebook**]



"Brilliant, if I do say so myself."

Wherever you work, you could be more impressive with a 256-color, TFT Active Matrix LCD Display. From Sharp, the leader in LCD. You could be more powerful with a 486DX 33 MHz, SL-enhanced processor with *Power Management*. And 4MB RAM expandable to 20MB. More productive with a 200MB fast-access hard drive with MS-DOS® 6.0 & Windows® 3.1 pre-installed. Plus a conveniently located front plug-in trackball. Not to mention more versatile with a PCMCIA Type II slot. Which explains why it was selected by **BYTE** as the best overall and best value in color notebooks. The Sharp PC-8650. Whether you're en route or at home, it's got more ways to make anyplace your workplace.



1-800-BE-SHARP

Or FastFax 201-529-9113
Product ID# 011

SHARP
FROM SHARP MINDS
COME SHARP PRODUCTS™



COPIERS • FACSIMILE • LASER PRINTERS • NOTEBOOK COMPUTERS • COLOR SCANNERS • PERSONAL DIGITAL ASSISTANTS • CALCULATORS
CORDLESS TELEPHONES • TYPEWRITERS • WORD PROCESSORS • WIZARD® ORGANIZERS

© 1994 Sharp Electronics Corporation. MS-DOS® & Windows® are registered trademarks of Microsoft Corporation. Simulated screen image.

An MCI Movie Player

Complete Listing

```
#include <windows.h>
#include <mmsystem.h>

#include <stdio.h>

RECT rcMovie;

long FAR PASCAL __export WndProc (HWND hWnd, UINT message,
    WPARAM wParam, LPARAM lParam) {

    PAINTSTRUCT ps;

    // Process the windows message
    switch (message) {
        case WM_PAINT:
            if (!BeginPaint (hWnd, &ps))
                return 0;
            EndPaint (hWnd, &ps);
            return 0;
        case WM_DESTROY:
            PostQuitMessage (0);
            return 0;
        case WM_LBUTTONDOWN:
            mciSendString ("stop coolMovie", NULL, 0, 0);
            return 0;
        case WM_LBUTTONDBLCLK:
            mciSendString ("seek coolMovie to start", NULL, 0, 0);
            mciSendString ("play coolMovie", NULL, 0, 0);
            return 0;
    }

    // Return to Windows
    return DefWindowProc (hWnd, message, wParam, lParam);
}

int PASCAL WinMain (HINSTANCE hInstance, HINSTANCE hPrev,
    LPSTR lpszCmd, int nCmdShow) {

    HWND hWnd;
    MSG msg;
    WNDCLASS wndclass;

    static char szCommand[80];
    static char szResult[80];
    static char szAppName[] = "MCI";

    // Register and create main window
    if (!hPrev) {
        wndclass.style = CS_DBLCLKS | CS_HREDRAW | CS_VREDRAW;
        wndclass.lpfnWndProc = WndProc;
        wndclass.cbClsExtra = 0;
        wndclass.cbWndExtra = 0;

        hWnd = CreateWindow (szAppName, szAppName,
            WS_CAPTION | WS_SYSMENU |
            WS_CLIPCHILDREN | WS_OVERLAPPED, CW_USEDEFAULT, CW_USEDEFAULT,
            CW_USEDEFAULT, CW_USEDEFAULT, NULL, NULL, hInstance, NULL);

        // Instantiate the movie
        mciSendString ("open SAMPLE.AVI alias coolMovie", NULL, 0, 0);

        // Make the frame just big enough for the movie
        mciSendString ("where coolMovie destination wait",
            szResult, sizeof szResult, 0);
        sscanf (szResult, "%d %d %d %d", &rcMovie.left,
            &rcMovie.top, &rcMovie.right, &rcMovie.bottom);
        AdjustWindowRect (&rcMovie, WS_CAPTION | WS_OVERLAPPED, FALSE);
        OffsetRect (&rcMovie, -rcMovie.left, -rcMovie.top);
        SetWindowPos (hWnd, 0, 0, 0, rcMovie.right, rcMovie.bottom,
            SWP_NOMOVE | SWP_NOZORDER);

        // Show the movie
        sprintf (szCommand, "window coolMovie handle %u state show",
            (unsigned int) hWnd);
        mciSendString (szCommand, NULL, 0, 0);
        sprintf (szCommand, "put coolMovie destination at %u %u %u %u",
            0, 0, rcMovie.right, rcMovie.bottom);
        mciSendString (szCommand, NULL, 0, 0);
        mciSendString ("seek coolMovie to start", NULL, 0, 0);

        // Show the window
        ShowWindow (hWnd, nCmdShow);
        UpdateWindow (hWnd);

        // Play the movie
        while (GetMessage (&msg, NULL, 0, 0)) {
            TranslateMessage (&msg);
            DispatchMessage (&msg);
        }

        // Clean up
        mciSendString ("close coolMovie", NULL, 0, 0);

        // Return to Windows
        return msg.wParam;
    }
}
```



Figure 3: An MCI program designed to be as similar as possible to the QuickTime program in Figure 1.

The MCSetVisible API function can be used to make the movie controller visible or invisible as necessary. A quick word of caution for readers new to QuickTime: Its movie-controller API function names all begin with the letters MC—one even begins with MCI! Don't confuse them with Microsoft's MCI API functions. Any resemblance is purely coincidental.

At the bottom of Figure 2, you can see the visible movie controller; it's the control bar under the bottom edge of the movie. While few VCRs are this simple, you'll recognize the play button, forward- and backward-stepper buttons, and a volume control on the left.

QuickTime is responsible for all of the Windows-type work necessary to manage this user interface. In fact, QuickTime programs, if coded correctly, should be unaware of the size, shape, or position of

the movie controller. This is because Apple has implemented a plug-in interface for such QuickTime components as movie controllers. You can write your own controllers, or third parties can supply them, without requiring any changes to your programs. For example, Apple supplies a movie controller useful for special-purpose navigable movies with a completely different user interface than the default movie controller shown in Figure 2 but with exactly the same API.

The movie-controller user interface translates user actions (such as a mouse click on the play button) into a call to the appropriate QuickTime API function. There's nothing magic about this; you could make these same API function calls directly from your program, simulating the behavior of the movie controller (if, of course, you wanted to do a lot of hard work). In addition, a set of API functions

exists to help you manage the movie controller itself. For example, our program makes this call:

```
MCGetControllerBoundsRect
(mcController, &rcMovie);
```

to determine the size of the rectangle enclosing the movie controller and the controller's associated movie. As you can see in Figure 2, this rectangle is later used to size the window in which the movie plays.

We said earlier that QuickTime is responsible for managing the movie-controller interface. Your program does, in fact, have one responsibility. Recall that movie controllers exist in the context of a window. In the corresponding window procedure, your program must ensure that the movie controller receives Windows messages:


```
if (MCIsPlayerMessage (mcController,
    hWnd, message, wParam, lParam))
    return 0;
```

MCIsPlayerMessage is usually coded at the top of the window procedure, before the classic switch statement. Also, if you have created more than one controller, you must code an MCIsPlayerMessage call for each. MCIsPlayerMessage returns TRUE if it acts upon the Windows message it receives. In this case, no further action is required, and your program should return control to Windows.

What kind of messages does MCIsPlayerMessage process? Certainly not those such as mouse clicks on the movie controller, because the controller's user interface exists in its own window with its own window procedure buried deep within the QuickTime DLLs. To find out more, let's explore what happens when the play button is clicked. As you might expect, the movie controller simply turns around and calls this QuickTime API function:

```
MCDAction (mcController,
    mcActionPlay, MAKELONG (1, 0));
```

Your program could equally well issue this call directly. The third parameter is the key. It sets the play rate to 1.0. In QuickTime, play rates are expressed as 16:16 fixed-point quantities. MAKELONG joins two 16-bit integers together to form a 32-bit integer. When used programmatically, this call can set the play rate to any value, including negative values, which make the movie play backwards.

The movie controller initially sets the play rate to 0.0, which explains why the movie doesn't begin playing immediately. When the play rate changes to a nonzero value, QuickTime starts scheduling the associated movie for playback. Scheduling satisfies your program's need for slices of time from Windows in order to show frames and play sounds. To do this, the QuickTime engine periodically sends a message to each Windows procedure associated with each movie. It is this scheduling message that is of primary importance to MCIsPlayerMessage.

As a matter of detail, QuickTime chooses an identifier for this message that won't conflict with any identifier that your application might use. QuickTime can't

use WM_USER or any displacement from WM_USER, because it can't know in advance which range of values might be in use. In fact, QuickTime obtains the identifier of its scheduling message from Windows through the RegisterWindowMessage call. However, this isn't foolproof. It is conceivable (but unlikely) for a rogue application to bypass the protection of RegisterWindowMessage and use a displacement from WM_USER that conflicts with the one chosen by RegisterWindowMessage for QuickTime.

This simple example reveals the QuickTime API for what it is: a low-level interface. Yet this example also hints at the kind of control you can have in a real-life digital-video product. We'll look at a couple of examples of this kind of control after we've studied a comparable MCI program.

FOR FURTHER STUDY Before we proceed, I'd like make some recommendations for further study. Understanding the API (whether it be QuickTime, MCI, or whatever) is only one step toward a successful digital-video program.

We've seen some systems, lavishly produced and ready for shrink-wrapping, that played movies at the underwhelming rate of 3 frames per second (fps). If you're scratching your head wondering why that's bad, consider that TV programs play at 30 fps and analog movies play at 24 fps.

This problem occurs because frames per second is no longer a very useful predictor of playback performance. Let's explore this with an example that uncovers what is a useful measure. Suppose your objective is to play back a 320-by-240 movie at 15 fps. You'll often see 320-by-240 used as a baseline measurement, because it's one-quarter of NTSC (National Television System Committee) resolution (full NTSC, except for the hardware-assisted MPEG systems, requires more horsepower than is currently available on all but high-end PCs). Let's also assume that the encoding you have chosen results in an average frame size of 10K. In addition, the movie has a 22-kHz, 8-bit, stereo sound track.

Some quick arithmetic shows that during playback a sustained data rate of approximately 195K per second is required. If you want to play this movie from a single-speed CD-ROM, capable of a sustained rate of only 90K per second, you can see that we're heading for a train wreck: The

CD-ROM can't deliver the movie data at the rate necessary for 15 fps playback.

Successful digital video-projects are always first engineered to limit the data rate to the capabilities of the target delivery system. You've seen that single-speed CD-ROM is capable of about 90K per second. The rule of thumb for CD-ROM

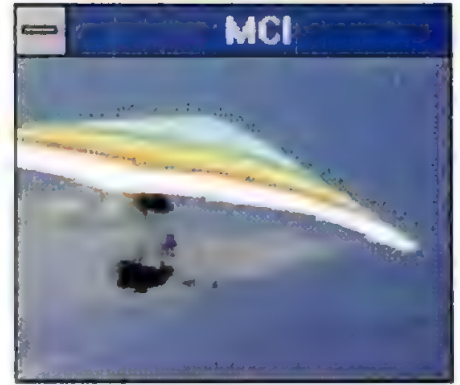


Figure 4: The MCI program shown in Figure 3 opens this movie (SAMPLE.AVI) and prepares it for playback. Unlike QuickTime, MCI does not define the movie controller, but you can add one programmatically.

is to take the advertised peak data-transfer rate and subtract about 60K per second. Current hard disk technology, on the other hand, allows for movies with data rates of 300 through 450K per second.

Once a data rate has been selected, frame rate simply becomes inversely proportional to image quality. Almost all encoding schemes are lossy (that is, they compromise image quality to reduce frame rate). So for a given data rate, higher compression results in higher frame rates but poorer image quality. Lower compression gives higher average frame sizes and lower frame rates but better image quality.

So back to the original example. Why did our ill-fated product perform so poorly? It's because the producers wanted a frame rate of 15 fps but allowed the data rate to exceed the capabilities of CD-ROM. During playback, the system simply couldn't keep up with the movie. Instead, they should have first considered data rate, and then frame rate. There are several techniques they could have used to improve the frame rate. The first is during the shoot itself. Some successful digital movies are filmed against a black background. This constant background allows an excellent compression factor, without significant loss

of image quality. The technique works well for movies that are designed for interactive play, in which the black background is acceptable. It obviously wouldn't work, however, if you wanted to digitize an existing analog movie.

Another technique is to use sophisticated, post-production software. My personal favorite is Apple's MovieShop, currently available only for the Mac. MovieShop takes a QuickTime movie as input and attempts to limit its data rate to a value you specify. It uses a variety of techniques including re-compression and elimination of duplicate frames. For example, a movie might contain a 2-second scene of a static object with a voice-over. Movie Shop will replace the 30 original frames in the original with a single frame of a 2-second duration.

Here's another example. We've also seen users, bitterly disappointed after purchasing one of those CD-ROM caching programs that promise a "100 times performance boost," wondering why it made their digital-video playback worse.

Caching, which relies on the fact that data read once will often be read again, is not what digital-video data needs, because the data is generally read just once. So a cache can waste time, because it always looks for requested data in the cache before going to disk and never finds the data. What is needed is streaming, which assumes that data will be read from beginning to end, and attempts to supply a steady stream of data at the same rate at which it is consumed.

These are only some of the nonprogramming issues you must confront while developing a successful digital-video program. Others include the correct choice of video encoding and realistic specifications of the target hardware on which your program will run. You've seen from the preceding examples how the two are strongly related. I usually recommend Cinepak as the best, general-purpose encoding method. It gives

good results on the widest range of target hardware. I also test a program's performance on a 33-MHz 386 computer with a single-speed CD-ROM and 8-bit graphics; if the digital video doesn't perform well on this configuration, I don't recommend that you distribute the program. Of course, this machine is woefully un-

derpowered compared with those currently shipping, but it's quite representative of the installed base and represents the worst-case scenario.

AN MCI PROGRAM

Figure 3 shows an MCI program, designed to be as similar as possible to the QuickTime program in Figure 1. It opens and plays a movie (SAMPLE.AVI).

Sample output is shown in Figure 4. As before, the necessary Windows infrastructure disguises the underlying simplicity of the interface.

MCI defines only movies, not movie controllers. To be fair to Microsoft, you should know that Video for Windows 1.1 ships with MCIWNDX.VBX, a Visual Basic control that provides a QuickTime-like movie-controller user interface. VB controls can also be called from any program that can communicate with a Windows DLL, so this capability could also be added to your C or C++ programs.

A movie plays in a window (one you create, or one the movie creates for itself). Movie instantiation could not be simpler:

```
mciSendString ("open SAMPLE.AVI  
alias coolMovie", NULL, 0, 0);
```

Open serves the additional purpose of associating an alias with a filename; all other MCI calls to the same movie will reference this alias rather than the filename directly. MCI uses the filename extension to determine which driver will handle the specific command. It does this through a combination of .INI file specifications. For example, the relevant section of my WIN.INI looks like this:

```
[mci extensions]  
mov=QTWVideo  
pic=QTWVideo  
jpg=QTWVideo  
avi=AVIVideo
```

SYSTEM.INI looks like this:

```
[mci]  
QTWVideo=mciqtw.drv  
AVIVideo=mciavi.drv
```

You can ask MCI for information about the movie. For example, this call obtains the rectangle that describes the size of the movie frames:

```
mciSendString ("where coolMovie  
destination wait", szResult,  
sizeof szResult, 0);  
sscanf (szResult, "%d %d %d %d",  
&rcMovie.left, &rcMovie.top,  
&rcMovie.right, &rcMovie.bottom);
```

It is equivalent in this context to the QuickTime `MCIGetControllerBounds Rect` call.

To play a movie in a window we provide (rather than one the movie creates for itself), we give MCI the movie's handle and the rectangle in which we wish the movie to appear:

```
wsprintf (szCommand, "window  
coolMovie handle %u state show",  
(unsigned int) hWnd);  
mciSendString (szCommand, NULL, 0,  
0);  
wsprintf (szCommand, "put coolMovie  
destination at %u %u %u %u", 0, 0,  
rcMovie.right, rcMovie.bottom);  
mciSendString (szCommand, NULL, 0,  
0);
```

Note the awkward hoops through which you must jump in order to construct an MCI string that contains parameters. For low-level programmers, the message-based alternative interface (not described here) is often a better choice. MCI does not give the programmer control of scheduling; this statement is all you need to play a movie:

```
mciSendString ("play coolMovie",  
NULL, 0, 0);
```

Of course, under MCI, movies are

Palette Conversion Routine

```
HFILE hfPal;
LOGPALETTE* plgpl;
HPALETTE hPal;
if ((plgpl = (LOGPALETTE *) LocalAlloc (LPTR, sizeof (LOGPALETTE) + (256 *
sizeof(PALETTEENTRY)))) != NULL) {
    if ((hfPal = _lopen ("mypal.pal", READ)) != HFILE_ERROR) {
        _lseek (hfPal, 20, SEEK_SET);
        _lread (hfPal, &(plgpl->palVersion), sizeof (plgpl->palVersion));
        _lread (hfPal, &(plgpl->palNumEntries), sizeof (plgpl->palNumEntries));
        _lread (hfPal, &(plgpl->palPalEntry[0]), plgpl->palNumEntries *
sizeof(PALETTEENTRY));
        _lclose (hfPal);
        hPal = CreatePalette (plgpl);
        LocalFree ((HLOCAL) plgpl);
    }
}
```

Figure 5: This code converts a .PAL palette to a standard Windows palette.

scheduled exactly the same way as with QuickTime; you just don't have to deal with scheduling as a programmer. This is sometimes a great simplification and at other times a great burden. Programming is easier, but some of the flexibility afforded by QuickTime is lost. For example, in QuickTime you could give cycles to another task, such as a lengthy calculation, but still play movies with degraded performance simply by withholding MCIs-PlayerMessage calls where appropriate.

PALETTE MANAGEMENT Let's take a look at a couple of areas in which the simplicity of MCI works against creating cool digital-video programs. The first is in palette management. MCI attempts to be "helpful" in this regard. In general, movies can contain preferred palettes for playback on 8-bit, palettized target devices. If these conditions exist, MCI will automatically assert the palette for you during playback. Sound good? Well, not really.

Most real-life applications are more complicated than these sample programs. They don't just show a movie and quit. Instead, they'll typically present a series of movies, sequentially or concurrently, against a rendered backdrop. Critical Path, for example, works in this mode. So if the movies use different palettes, MCI will cause a palette shift with each new movie. The resulting continuous psychedelic show can be very distressing to the user.

The obvious solution is to have each movie and all the rendered backdrops use the same palette in order to avoid disagreement about which colors to use.

Now we need to solve the problem of how to create a single palette that can faithfully represent multiple images. Tom McFarland of Allen Communication in Salt Lake City has done some interesting research in this area. He solved the problem analytically and manually created what he termed a "universal palette." His palette works well with images of people with realistic flesh tones, black and white images, and still leaves enough primary colors for coloring other on-screen objects.

But a one-size-fits-all approach is not usually accurate enough for digital-video programs, where the range of colors varies greatly from production to production. Instead, we create a single super-palette for each. I prefer the term *super* rather than *universal*, because the palette is not designed to work well for everything; it's just a reasonable *superset* of the colors used in each movie and each backdrop of a single production.

I've offset the word *superset*, because by definition a palette can contain only 256 entries, and therefore a super-palette cannot strictly be a superset of all the palettes from which it is derived. Instead, it contains the 256 colors that are the closest matches. Converting real colors into a palette is called color reduction and done properly, it's a computationally demanding operation. Fortunately, good commercial software is available to assist.

The best program I know that does this is Equilibrium's DeBabelizer (although it only runs on the Mac). First, we feed DeBabelizer a series of representative

frames from the application's movies plus the bitmaps that make up the application's backdrops. DeBabelizer then performs a color reduction and adds these colors to a super-palette. We then port this palette to the PC as a standard .PAL file. The code in Figure 5 converts it at runtime to a standard Windows palette.

EFFICIENT PRELOADING Another critical area for real-life digital-video applications is the smooth flow of operation. I draw the following example from a popular application. During the shoot, two cameras were trained on the subject simultaneously. Both were synchronized, but one, for example, filmed a close-up while the other captured a different perspective. The application allows the user to display the synchronized movie from either of the cameras and switch back and forth at will.

With QuickTime, the two movies are first instantiated by using the API functions that you've already seen.

```
OpenMovieFile ("A.MOV", &mfMovie,
OF_READ);
NewMovieFromFile (&mA, mfMovie,
NULL, NULL, newMovieActive, NULL);
CloseMovieFile (mfMovie);
OpenMovieFile ("B.MOV", &mfMovie,
OF_READ);
NewMovieFromFile (&mB, mfMovie,
NULL, NULL, newMovieActive, NULL);
CloseMovieFile (mfMovie);
```

We can also create a movie controller with the NewMovieController API function. Depending on the user selection, the program chooses which movie to play. Assume that the flag bBMovie is TRUE if the user has selected the "B" movie:

```
mMovie = bBMovie? mB : mA;
```

Use the GetMovieTime API function to note the position in the currently playing movie. For this example, you can ignore the units in which this position is expressed and the structure of the TimeRecord that GetMovieTime populates with this position:

```
TimeRecord tr;
...
GetMovieTime(bBMovie? mA : mB, &tr);
```


GET NONSTOP SYSTEMS INFORMATION...

AND 3 DISKS - FREE!



Don't miss a single product report or productivity-enhancing tip — subscribe to PC Magazine today. You'll get 22 issues for only \$29.97 — that's 54% off the \$64.90 cover price! Better yet, sign up for two years and get 44 issues for just \$49.97 — a savings of 62%!

Order now and you'll also get **PC Magazine's "Utilities Disk Library" on 3 disks — FREE** with your paid subscription. These 103 utilities, selected especially for new subscribers by PC Magazine's editors, let you up-grade your system, boost your PC power, and simplify tasks — all at the touch of a key. This exclusive software is available *only* to new subscribers!

ONE YEAR
(22 issues) for \$29.97.
YOU SAVE 54%!

TWO YEARS
(44 issues) for \$49.97.
YOU SAVE 62%!

**Call toll-free today:
1-800-289-0429**

Basic one-year subscription \$44.97; on newsstands \$64.90. Canada and foreign add \$32.00 per year. U.S. funds only. Canadian GST included. Please allow 30 days for shipment of first issue. FREE disks will be sent upon payment.

PC TECH

Power Programming

Next, disassociate the current movie from the movie controller with `MCRmoveMovie` and associate the new one with `MCSetMovie`:

```
MCRmoveMovie (ui.mcController);
ptMovie.x = ptMovie.y = 0;
MCSetMovie (mcController, mMovie,
hWnd, ptMovie);
```

Finally, point the new movie to the correct position to start it playing:

```
MCDoAction (mcController,
mActionGotoTime, &tr);
MCDoAction (mcController,
mActionPlay, (LPVOID) MAKELONG(
1, 0));
```

How does this provide a smooth transition? First, the `NewMovieFromFile` call is relatively slow. It parses the movie file and prepares all the internal control blocks, so you need to execute it only once. Second, the remaining QuickTime calls in the example are fast and can be executed quite quickly. Typically, this sequence of code produces only a pause of two or three frames as it transitions from one movie to the next.

CONCLUSION Let this article serve as a jumping-off point for some of the useful programming techniques for QuickTime and Video for Windows. If you're as fascinated by digital video as I am, you'll want to get the developer's kit for both development environments. QuickTime for Windows is available from Apple. The Microsoft Video for Windows, Version 1.1, developer's kit is currently available on the Microsoft Developer Network CD-ROM.

Are you ready to add digital video to your applications? Using the techniques I've outlined in this column, you can begin to combine traditional computing power with entertaining and rich video sequences. You don't have to wait until the 21st century for the video revolution—it's here today! □

MARK FLORENCE IS PRESIDENT OF THE SAN FRANCISCO CANYON COMPANY. CANYON WROTE QUICKTIME FOR WINDOWS FOR APPLE COMPUTER. HE CAN BE REACHED THROUGH COMPUERVE (72371,104) OR APPLELINK (CANYON).

Utilities

BY NEIL J. RUBENKING

Protect Your .INI Files with INIBAK

Windows applications use .INI files to store information about the user's preferences, and Windows itself stores essential system information in .INI files. If the WIN.INI or SYSTEM.INI files get corrupted, Windows may not run at all. If CONTROL.INI is damaged, the system colors may change so that you can't read any text, or Windows may lose access to peripherals. And individual Windows applications may fail if their .INI files are damaged. Sound scary? It gets worse: You can't just store a backup of the essential .INI files, because they change during the course of your ordinary activities in Windows. What you really need is a program that will automatically detect changes and make backups as necessary. INIBAK is that program.

When INIBAK first begins protecting an .INI file, it makes a backup copy of that file in a special directory. The backup has the same filename as the .INI file, except it has a file extension of .000. The next time INIBAK backs up the same file, it pushes the first backup down the "stack" by changing that backup's extension to .001 and gives the new backup the .000 extension. Each time INIBAK adds another backup, it pushes the old ones down to the next higher extension. When the number of backups for a given .INI file exceeds a user-defined maximum (from 3 to 12), INIBAK automatically deletes the oldest.

When INIBAK is on the job, you can easily recover if a berserk program trashes your WIN.INI file or if you accidentally overwrite SYSTEM.INI with a memorandum. As long as the damage doesn't prevent Windows from loading, INIBAK

will handle the restoration for you. Even if Windows won't run, you can use DOS's COPY command to copy the most recent backup to the .INI file and then start Windows.

To get your own copy of INIBAK, download INIBAK.ZIP from Library 2 of PC MagNet's Utilities/Tips Forum. This file includes only the executable program INIBAK.EXE and its help file INIBAK.HLP. INIBAK relies on the Visual Basic 3.0 support library VBRUN300.DLL and the VB 3.0 common-dialogs custom control CMDIALOG.VBX. If these files aren't already present on your system, download VBRUN3.ZIP and CMDIAL.ZIP from Library 10 of PC MagNet's Utilities/Tips Forum. If you want the complete source code for this utility, you can download INISRC.ZIP from the same place. You can also obtain the utility through the mail. For details, see the sidebar "Guide to Our Utilities &

How to Get Them." INIBAK requires Windows 3.1.

USING INIBAK To install INIBAK, copy INIBAK.EXE and INIBAK.HLP into the directory of your choice. If you don't already have VBRUN300.DLL and CMDIALOG.VBX, copy them into your Windows system directory (usually C:\WINDOWS\SYSTEM). Finally, add INIBAK to your Program Manager's Startup group. Once you've done this, each time you start Windows, INIBAK will check to see if any protected .INI files have changed (see Figure 1). If you run INIBAK again during the same Windows session, it will skip the automatic file checking.

The very first time you run INIBAK, it doesn't have a list of files to protect, so it does no checking. Select Add INI File to List from the File menu, and you'll get a Windows 3.1 dialog box that lets you choose an .INI file. You should add WIN.INI, SYSTEM.INI, and CONTROL.INI right away. Don't try to add files that aren't .INI files, as INIBAK's file comparison system works *only* for .INI files.

Some .INI files aren't good candidates for INIBAK's protection. For example, if you've checked the Save Settings on Exit option in Program Manager, PROGRAM.INI could change every time you start Windows. If you want to remove INIBAK's protection from a file, highlight that file in the list, and then select Delete INI File from List from the File menu. After asking for confirmation, INIBAK will remove the file from its list and delete all of its backups. Of course, the .INI file itself is not deleted.

If you know that a particular .INI file has been corrupted in some way, you don't have to wait for INIBAK to tell you that the file has changed. Just select Restore INI File from Backup from the File menu. This brings up the Restore form, which displays a list of available backup files. The files are distinguished by their extensions: .000 is the most recent backup, .001 is the next most recent, and so on. Usually you'll want to restore the most recent backup. If you restore a different backup, INIBAK will rearrange the filenames to give the one you chose the .000 extension. Quite often, changes to .INI files don't take effect until Windows restarts, so INIBAK gives you the option

Top 10 Utilities

Rank	Utility
1	BAT2EXEC - Compiles batch files
2	MBOOT - Multiple boot program
3	FINDIRQ - Locates available IRQs
4	MONITOR - Monitors system resources
5	DIRMATCH - Displays directories side by side
6	BUGS - Windows 3.1 screen saver
7	INCTRL - Controls Windows' installation
8	WTIME - Keeps PC clock accurate
9	EMS40 - Converts extended memory
10	CLIPSTAG - Enhances Windows Clipboard

This list is based on the total number of downloads each utility has had on PC MagNet over the past 12 months. To download these files, type GO ZNT:TIPS. For more information, see the sidebar "Guide to Our Utilities & How to Get Them."

of restarting Windows right away.

If you've just made some changes to your setup and want to back up any .INI files that have been changed, select Check INI Files Now from the File menu. If you pressed the Ignore button when INIBAK warned you about a changed file, you can select this menu option to see the warning again.

INIBAK maintains from 3 to 12 levels of backups; the default is 5. To set a new value for the number of backup levels, pull down the Levels menu and click on the number you want. If INIBAK detects more backup files than the new limit permits, it will ask if you want to delete the oldest. Press Yes to delete the old backups right away. Answer No to leave them in place, although they will be deleted automatically the next time you add a new backup for the corresponding .INI file. You can also press Cancel to leave the number of backup levels unchanged.

HOW INIBAK CHECKS FILES A Windows .INI file is made up of key lines having the form *key=value*, separated into sections by lines having the form *[Section title]*. The order of the keys within a section isn't important, nor is the order of the sections within the .INI file. Also, it doesn't matter whether a key name or section title is in uppercase, lowercase, or mixed case. Comments (lines beginning with a semicolon) and blank lines are ignored. When INIBAK compares an .INI file with its most recent backup, the program takes all of these facts into account.

To compare two files, INIBAK first copies each file to a temporary file whose format lends itself to comparison. The new file's lines are sorted alphabetically, and each line has the form *[Section title] key=value*. INIBAK can spot differences between the two files by reading one line at a time from each file and comparing the two lines. If any differences are found, INIBAK displays them using the Warning form shown in Figure 2.

The two list boxes in the lower half of the Warning form list the lines that were added to or deleted from the .INI file since the last backup. Changes to keys appear as dual entries; they will appear in the deleted list with the old value and in the added list with the new value.

When INIBAK displays the Warning form, you have four choices, three of

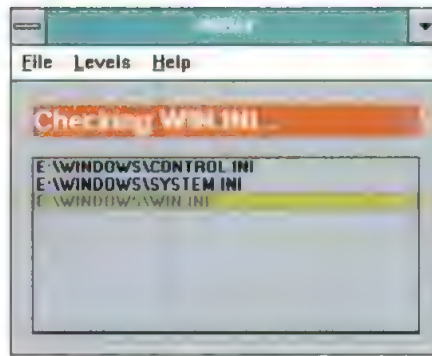


Figure 1: Each time you start Windows, INIBAK checks protected .INI files against the most recent backup and warns you of any changes.

which are illustrated on the form itself. If after examining the changes you decide that the modified .INI file is worth saving, you can press the Add Changed File to Stack button to make a new backup copy. INIBAK renames this file with the .000 extension and deletes the oldest backup file. If you'd rather keep your oldest backup and throw away the newest instead, press the Overwrite Top File Of Stack button. This will cause INIBAK to copy the current .INI file over the most recent backup without disturbing any of the older backup files.

What if the Warning form shows dozens of deleted lines, nonsensical lines, or other changes that suggest a corrupted .INI file? Press the Restore File from Stack button. INIBAK displays the same Restore form that comes up when you choose the Restore option from the File menu. Select a backup to restore, restart Windows, and you're back in business.

Your fourth choice is Ignore Changes. Perhaps you want to study the contents of the .INI file and its backups so that you can select which backup to use before deciding whether to restore an older .INI file. The next time INIBAK checks files, you'll get the same warning.

If you need help while using the program, select one of the options from the Help menu. You can also press F1 at any time for context-sensitive help on the highlighted menu item or on the control that has the focus. That's all you need to

protect your .INI files with INIBAK.

PROGRAMMING INIBAK INIBAK isn't a complicated program. The most difficult part of the design process was devising the technique for comparing .INI files. That being the case, I was able to spend some time devising a special About box. INIBAK uses the box to respond to the About INIBAK... choice on the Help menu, but it's self-contained enough that you can include it in *any* Visual Basic program.

The main form's Load method takes care of a number of initialization tasks. It uses the GetWindowsDirectory() function to fill the global variable WindowsDir with the name of the directory that contains Windows. Note that it's necessary to allocate space for the function's return value by first setting the variable to a string of 145 spaces. After getting the Windows directory, the Load method truncates the value at the terminating zero character and adds a backslash if necessary.

INIBAK stores its files in a subdirectory called INIBAK\ under the Windows directory; if the subdirectory doesn't exist, the Load method creates it. The global variable IniBakDir holds the full pathname of this directory including a final backslash. The Load method then reads the number of backup levels from INIBAK.INI, using 5 as the default value.

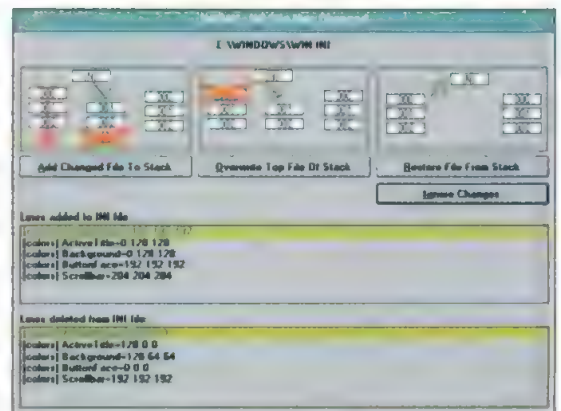


Figure 2: Here the user has changed color schemes in Control Panel since the last .INI file backup; INIBAK lists the lines added and deleted.

It forces the number into the range of 3 through 12 and puts a check mark by the corresponding item on the Levels menu.

Next, the Load method initializes two invisible controls in the main form. INIBAK uses the common dialog-box control `CmDialog1` when the user selects .INI

IniChanged()

```

Function IniChanged% (ByVal OrigName$)
' Compare the INI file named in the OrigName parameter with its most
' recent backup.
Dim xPath$, xName$, xExt$
FileSplit OrigName, xPath, xName, xExt
' In case the user has deleted one or more of the backup files, the
' TakeUpSlack function renames them in order to *.000, *.001, etc.
TakeUpSlack xName
' If the user has "deleted" all backups for this file, "make" a
' backup and get out.
Dim BakName$
BakName = xName + ".000"
If File1.ListCount = 0 Then
Msg = "No backup exists for " + OrigName + ". Creating backup."
MsgType = MB_ICONINFORMATION
MsgBox Msg, MsgType, MsgTitle
FileCopy OrigName, IniBakDir + BakName
Exit Function
End If
' The Normalize subroutine puts an INI file's lines in order, so it
' can be easily compared with another INI file.
Dim NowNorm$, BakNorm$
NowNorm = IniBakDir + "TEMP_NOW. $$$"
BakNorm = IniBakDir + "TEMP_BAK. $$$"
Normalize OrigName, NowNorm
Normalize IniBakDir + BakName, BakNorm
Dim FNumNow%, FNumBak%
FNumNow = FreeFile
Open NowNorm For Input Access Read Shared As FNumNow
FNumBak = FreeFile
Open BakNorm For Input Access Read Shared As FNumBak
Dim nowLine$, bakLine$, NoLine$, Comp%
nowLine = ""
bakLine = ""
NoLine = Chr$(255) ' greater than any possible string in the file.
' The two list boxes in Form2 serve to hold lines that DIFFER between
' the two normalized files. List1 holds files that are in the
' current version but not in the backup (added lines) and List2 holds
' lines that are in the backup but not in the current version
' (deleted lines). If the value of a key is CHANGED, the old line
' appears as deleted and the new line as added.
Form2.List1.Clear
Form2.List2.Clear
Do While (bakLine <> NoLine) Or (nowLine <> NoLine)
Comp = StrComp(nowLine, bakLine, 1)
Select Case Comp
Case Is < 0
' line in current file is < line in bak file - added
Form2.List1.AddItem nowLine
' get another line from current file
nowLine = NoLine
If Not EOF(FNumNow) Then Line Input #FNumNow, nowLine
Case 0
' get another line from both files
nowLine = NoLine
If Not EOF(FNumNow) Then Line Input #FNumNow, nowLine
bakLine = NoLine
If Not EOF(FNumBak) Then Line Input #FNumBak, bakLine
Case Is > 0
' line in current file is > line in bak file - deleted
Form2.List2.AddItem bakLine
' get another line from bak file
bakLine = NoLine
If Not EOF(FNumBak) Then Line Input #FNumBak, bakLine
End Select
Loop
Close FNumBak, FNumNow
KillSafe NowNorm
KillSafe BakNorm
IniChanged = Form2.List1.ListCount + Form2.List2.ListCount > 0
End Function

```

Figure 3: Function `IniChanged()` returns TRUE only if the specified .INI file has changed since its last backup.

files to protect. The Load method sets its initial directory to the Windows directory and sets the flags field to `OFN_PATHMUSTEXIST` or `OFN_NOCHANGEDIR`. These flag values indicate that the common dialog-box should return names only of existing files and that it should switch back to the initial directory when it's done. Common dialog-box controls are always invisible when not in use, but the File1 list-box control is invisible because its Visible field is set to FALSE. The Load method sets File1's Path field to INIBAK's backup directory. Several of the subroutines and functions in INIBAK use File1 to get the filenames in the backup directory.

Now INIBAK reads its own .INI file to get the names of the files it should protect. These filenames are stored in the section [INI Files], and their key names are File1 through File10. The Load method calls the user-defined function `GPPS()`, which allocates space for the return value, calls the API function `GetPrivateProfileString()`, and then truncates the result at the terminating zero character.

It doesn't make sense for INIBAK to check automatically for changes every time you execute the utility. You might be loading INIBAK just to add or remove .INI files from its list or to restore a partic-

ular backup. Generally, you need only check for changes once per Windows session, so INIBAK uses a Windows structure called an *atom* to determine whether the program has already been executed during the current Windows session.

Windows maintains a global data structure called the *global atom table*, which relates a particular character string to a unique number called an atom. When a program adds a string that wasn't already in the table, the program gets back a unique number associated with that string. When a program adds a string that's already in use, Windows returns the existing number and increments the reference count for that string. Atoms are most commonly used to pass strings among programs communicating by DDE. INIBAK adds the name of its backup directory to the atom table the first time it runs in a given Windows session. Subsequent runs during the same session will detect that that string is already present and will skip the file-checking step by using the following code:

```

If GlobalFindAtom(IniBakDir)=0 Then
Dim TheAtom%
TheAtom=GlobalAddAtom(IniBakDir)
menuCheck
End If

```

HOW INIBAK CHECKS FILES INIBAK's `IniChanged()` function (Figure 3) takes one parameter: an .INI filename. The function returns TRUE only if that file differs from the latest backup. INIBAK calls the user-defined function `FileSplit()` to separate the full pathname of the input file into path, filename, and extension, and then passes the name portion to the `TakeUpSlack()` subroutine.

The `TakeUpSlack()` subroutine makes sure that the backups for a given .INI file have the extensions .000, .001, .002, and so on, with no gaps. It sets the File1 control's Pattern field to the .INI filename plus .0*, which causes the File1 control to fill with a sorted list of matching files. Then it steps through the list, checking that each file's extension matches its order in the list—.000 for the first file, .001 for the second, and so on. If necessary, it renames the file to give the file the correct extension.

If there aren't any backups for the selected file, `IniChanged()` displays a message to inform you of this fact, makes a backup, and quits. Otherwise, `IniChanged()` gets ready to compare the .INI file with that file's latest backup. `IniChanged()` saves the current drive and directory and switches to the backup directory. Then it calls the `Normalize()`

subroutine, which converts an .INI file into a sorted list of keys and section headings. IniChanged() converts the current .INI file into TEMP_NOW.*** and the first backup into TEMP_BAK.***; these temporary files are deleted before IniChanged() returns.

The Normalize() subroutine (Figure 4) uses the two list boxes in the Warning form as a sorting device. It adds unsorted lines to the sorted list box, and then reads out the sorted lines from top to bottom. For sorting small numbers of items in VB programs, a sorted list box is ideal. Normalize() reads through the input file, searching for section titles. When it finds one, Normalize() creates a string consisting of the section title plus that section title's file position and adds the string to Form2.List1—for example, [Desktop]469.

Next, Normalize() steps through the sorted entries in Form2.List1 and reads the keys in each section. Normalize() uses the stored position to set the file pointer to the beginning of the section, and then reads each key line and stores it in Form2.List2, ignoring blank lines and comments. When Normalize() reaches the end of the section, Normalize() writes the sorted list of keys to the output file, prefixing each with the section name.

Windows supplies functions for reading and writing .INI files, but INIBAK can't use them. First, Windows doesn't provide a way to get a list of all the section headings in an .INI file. Second, Windows

can't return multiple values for a single key. Some of the important keys in SYSTEM.INI, notably *device=*, can have dozens of values. Thus, it's more practical for INIBAK to read the .INI file as a plain-text file.

After both files have been normalized, IniChanged() compares them. Since the lines in the files are sorted, IniChanged() can read them sequentially and compare the lines in each file. IniChanged() uses the Visual Basic StrComp() function to compare the strings; the third parameter of 1 means StrComp() should ignore case. If one line is smaller than the other, it means that the smaller line is not present in the other file. In that case, IniChanged() adds the line to one of the list boxes in the Warning form and reads another line from the same file. After processing the files, IniChanged() returns TRUE if either of the list boxes is not empty. When INIBAK displays the Warning form, the form is already loaded with the lists of added and deleted lines.

INIBAK'S ABOUT BOX Every Windows program should have an About box that displays at least the program's name, version number, and copyright information. Many About boxes provide much more. Program Manager's, for example, displays the registered user, the company name, the Windows mode, the amount of memory free, and the free system resources (FSR) percentage.

After writing About boxes for several

different programs, I realized that they were all pretty much the same. For INIBAK, I created a generic About box that can be used in any Visual Basic program with a single function call. By default, it provides the following pieces of information:

- program name and version
- program's icon
- copyright information
- two lines of program-specific data
- user and company names (Windows 3.1 only)
- Windows and DOS versions
- Windows mode (Standard or Enhanced)
- free memory
- math coprocessor (present or absent)
- free system resources (Windows 3.1 only).

All of the items after the copyright information are optional. If a line of data is excluded, the About box moves the remaining lines up and shrinks to fit. Figure 5 shows the About box for INIBAK, with all of the system information on display.

To use the About box in a VB program, add ABOUTBOX.TXT and ABOUTBOX.BAS to the program's Project window. The declarations section of ABOUTBOX.BAS contains declarations for all the Windows API functions required to get the system information plus a set of AB_NO_*** constants that are used to suppress particular lines of output. All the program has to do is call the DisplayAboutBox()

Normalize()

```
Sub Normalize (ByVal InName$, ByVal OutName$)
' An INI file is composed of sections and keys. A section heading is
' enclosed in [] square brackets, and a key takes the form
' keyname=value. Each key belongs to the section whose heading is
' above it. The order of the sections and the order of keys within
' sections does not matter. This procedure takes an INI file and
' generates a "normalized" file in which each line has the form
' "[section]key", and the lines are in sorted order.
Dim FNumIn%, FNumOut%
FNumIn = FreeFile
Open InName For Input Access Read Shared As FNumIn
FNumOut = FreeFile
Open OutName For Output Access Write As FNumOut
Dim aLine$, Locn%
' Get the section headings and store them in List1. The list has
' the sorted property, so they're automatically sorted. Along with
' each section heading, store its "location" in the INI file.
Form2.List1.Clear
Do While Not EOF(FNumIn)
    Locn = Seek(FNumIn)
    Line Input #FNumIn, aLine
    aLine = Trim$(aLine)
    If (Left$(aLine, 1) = "[") And (Right$(aLine, 1) = "]") Then
        Form2.List1.AddItem aLine + Str$(Locn)
    End If
Loop
Dim N%, M%, bLine$
' Stepping through List1 in order, seek to the start of each section
' heading and store the keys from that section into List2. Again
```

```
' the list is automatically sorted. Comments and blank lines are
' ignored.
For N = 0 To Form2.List1.ListCount - 1
    aLine = Form2.List1.List(N)
    Form2.List2.Clear
    Locn = Val(Mid$(aLine, InStr(aLine, "[") + 1))
    Seek FNumIn, Locn
    ' Re-read the section title line
    Line Input #FNumIn, aLine
    aLine = Trim$(aLine)
    If EOF(FNumIn) Then Exit Do
    Line Input #FNumIn, bLine
    bLine = Trim$(bLine)
    ' If we've reached the next section header, exit the loop
    If Left$(bLine, 1) = "[" Then Exit Do
    If (Left$(bLine, 1) <> ";") And (bLine <> "") Then
        Form2.List2.AddItem bLine
    End If
Loop
' Write out the sorted list of keys, prefixing each with the
' section name.
For M = 0 To Form2.List2.ListCount - 1
    Print #FNumOut, aLine; " "; Form2.List2.List(M)
Next M
Next N
Close FNumIn, FNumOut
End Sub
```

Figure 4: Blank lines and comments aren't important in an .INI file; neither is the order of sections or of keys within a section. Normalize() converts an .INI file into a sorted list of keys and section headings.



subroutine.

DisplayAboutBox() (see Figure 6) takes a whopping 11 parameters. The form from which this subroutine is called is passed as the first parameter. DisplayAboutBox() extracts the icon from this form and determines where to position its message box on the screen. Next comes the program name and version number, the copyright date, and the copyright holder's name. The Ex1\$ and Ex2\$ parameters are program-specific information, displayed just below the copyright. Simply pass empty strings if you don't need these lines.

The Exclude% parameter determines which lines of system information will be excluded; a value of 0 means nothing is excluded. To exclude items, combine the corresponding AB_NO_XXX constants from ABOUT-BOX.BAS using the OR operator and pass the result as the Exclude% parameter. For example, to eliminate the DOS and Windows version numbers, pass

AB_NO_WINVER OR AB_NO_DOSVER

Since the techniques for getting the registration information and the FSR percentage are specific to Windows 3.1, the About box automatically adds AB_NO_

nally, the Fore and Back parameters control the foreground and background colors of the About box. Set them to 0 to use the default Windows system colors.

The DisplayAboutBox() subroutine takes care of centering the About box and setting the colors. It puts the program's icon in place and fills in the box's caption, the program name, and the copyright information. If the program-specific lines are present, this function copies them into a pair of label controls; otherwise, it eliminates them by calling the user-defined subroutine EliminateLabel(). Finally, DisplayAboutBox() loads the About box form, which is named FAB, by calling its Show method with the MODAL switch. MODAL, a constant found in VB-provided file CONSTANTS.TXT, means the calling program can't continue until the About box is closed. Note that your program must never directly load the About box form because of the required initialization performed in DisplayAboutBox().

The About box form's Load method consists of a series of discrete code sections that check whether a particular piece of system information is excluded. If it is, a call to EliminateLabel() wipes out the line; otherwise, the code acquires and

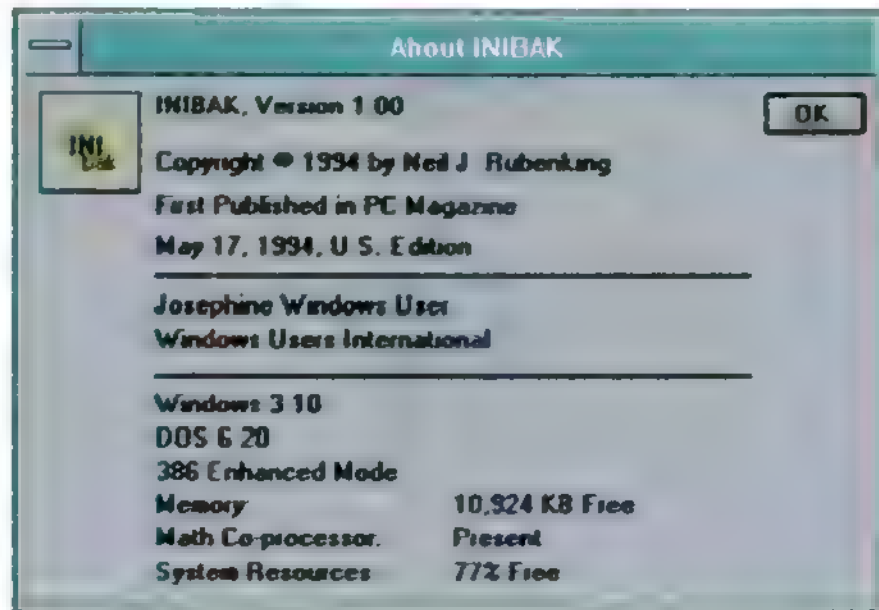


Figure 5: The source code for INIBAK's About box can be incorporated into any Visual Basic program.

USER, AB_NO_COMPANY, and AB_NO_FSR to the Exclude% parameter if the Windows version is 3.0.

If the Center% parameter is TRUE, the About box will be centered on the screen. Otherwise, the box will display on top of the calling form, offset to the right and downward. Naturally, if this would push it off the edge of the screen, DisplayAboutBox() adjusts its position. Fi-

DisplayAboutBox()

```
Sub DisplayAboutBox (F As Form, ByVal ProgName$, ByVal Version, ByVal
CoprDate, ByVal CoprName$, ByVal Ex1$, ByVal Ex2$, ByVal Exclude%,
ByVal Center%, ByVal Fore%, ByVal Back%)
'Your program simply calls this function to display an about box.
'F - the main form of the calling program, used to get an
' icon for display and to position the about box.
'ProgName - program name, for caption and first line
'Version - version number, displayed as #.#
'CoprDate - copyright year
'CoprName - copyright holder's name
'Ex1 - extra data line 1 (optional)
'Ex2 - extra data line 2 (optional)
'Exclude - used to exclude info from the about box. AB_NO_XXX
constants are bit-flags for this parameter. e.g. to
exclude displaying DOS & Windows versions, pass
AB_NO_DOSVER OR AB_NO_WINVER
'Center - if TRUE, About box is centered on screen; if FALSE, About
box is displayed offset from calling window.
'Fore,Back - foreground and background colors for box; 0 to use default
Excl = Exclude
Load FAB
Dim N%
If Fore Then
FAB.ForeColor = Fore
FAB.CoprLabel.ForeColor = Fore
FAB.NameLabel.ForeColor = Fore
For N = 0 To 14
FAB.OptionLabel(N).ForeColor = Fore
Next N
FAB.Shape1.BorderColor = Fore
End If
If Back Then
FAB.BackColor = Back
FAB.CommandOK.BackColor = Back
FAB.CoprLabel.BackColor = Back
FAB.NameLabel.BackColor = Back
FAB.Shape1.FillColor = Back
For N = 0 To 14
FAB.OptionLabel(N).BackColor = Back
Next N
```

```
End If
If Center Then
FAB.Left = (Screen.Width - FAB.Width) \ 2
FAB.Top = (Screen.Height - FAB.Height) \ 2
Else
' Place the About box over the calling window, offset downward
' and to the right
Dim Tmp% ' variable to keep lines of code from becoming TOO long
Tmp = GetSystemMetrics(SM_CXSIZE)
FAB.Left = F.Left + Tmp * Screen.TwipsPerPixelX
Tmp = GetSystemMetrics(SM_CYCAPTION) + GetSystemMetrics(SM_CYMENU)
FAB.Top = F.Top + Tmp * Screen.TwipsPerPixelY
' If about box now extends off the screen, move it back ON
If FAB.Left + FAB.Width > Screen.Width Then
FAB.Left = Screen.Width - (FAB.Width + 30)
End If
If FAB.Top + FAB.Height > Screen.Height Then
FAB.Top = Screen.Height - (FAB.Height + 30)
End If
End If
FAB.IconPicture.Picture = F.Icon
FAB.Caption = "About " + ProgName$
Dim Temp$ ' variable to keep lines of code from becoming TOO long
Temp = ProgName$ + ", Version " + Format$(Version, "#.##")
FAB.NameLabel.Caption = Temp
Temp = "Copyright © " + CoprDate + " by " + CoprName
FAB.CoprLabel.Caption = Temp
If Ex1 = "" Then
EliminateLabel 0
Else
FAB.OptionLabel(0).Caption = Ex1
End If
If Ex2 = "" Then
EliminateLabel 1
Else
FAB.OptionLabel(1).Caption = Ex2
End If
FAB.Show MODAL
End Sub
```

Figure 6: Any VB program can have a classy About box with no more effort than a call to the DisplayAboutBox() routine.



displays the desired information.

Most of the function calls will be familiar to Windows programmers, but the ones that get the user- and company-registration information deserve special mention. Credit for discovering this technique goes to Matt Pietrek, who described this technique in his Windows Q & A column of October 1993 in *Microsoft Systems Journal*. Pietrek discovered that these strings

are stored as string resources in Windows' USER.EXE file, with index numbers 514 and 515. The About box's Load method calls LoadLibrary() to get an instance handle for the User Library, and then restores the library's previous reference count by calling FreeLibrary(). This function passes the instance handle to the LoadString() API function to get the strings themselves.

CONCLUSION Each time you start Win-

dows, INIBAK checks for changes in your .INI files. This can pay off in a big way if anything untoward ever happens to one of them. And if you're a VB programmer, you'll enjoy the ease of adding a full-scale About box to your programs with a single function call. □

NEIL J. RUBENKING IS TECHNICAL EDITOR OF PC MAGAZINE.

GUIDE TO OUR UTILITIES & HOW TO GET THEM

INIBAK

PURPOSE: INIBAK automates the backup of selected Windows .INI files. If an .INI file becomes corrupted, INIBAK can be used to restore an earlier version.

SETUP: To install INIBAK, copy INIBAK.EXE and INIBAK.HLP into the directory of your choice, and if you don't already have VBRUN300.DLL and CMDIALOG.VBX, copy them into your Windows system directory (usually C:\WINDOWS\SYSTEM).

Finally, add INIBAK to your Program Manager's Start-up group so that it will be launched each time you load Windows. If you run INIBAK again during the same Windows session, it will skip the automatic file checking.

REMARKS: When INIBAK first extends its protection to an .INI file, it makes a backup copy of that file in a special directory. The backup has the same filename as the .INI file but with a file extension of .000. The next time INIBAK backs up the same file, it pushes the first backup down the "stack" by changing that file's extension to .001 and gives the new backup the .000 extension. Each time INIBAK adds another backup, it pushes the old ones down to the next higher extension. When the number of backups for a given .INI file exceeds a user-defined maximum (from 3 through 12), INIBAK automatically deletes the oldest.

Each time you start Windows, INIBAK checks for changes in your selected .INI files. If a change is detected, INIBAK will display a Warning form that lists the differences. If you want, you can restore a backup version of the .INI file at this time. But you don't need to wait for a warning to restore an earlier version: This option is also available from the main INIBAK menu.

Some .INI files are not good candidates for protection. If you've checked the Save Settings on Exit option in Program Manager, for example, PROGMAN.INI could change every time you start Windows, so you probably would not want to select it within INIBAK.

PC Magazine's utilities are available by modem from PC MagNet, our on-line service. PC MagNet is part of ZiffNet, a group of on-line services from Ziff-Davis Publishing Company. ZiffNet is hosted by CompuServe Information Service.

THE FIRST TIME If you've never used ZiffNet, you'll need to find the access number nearest you. First, set your communications software to 7 data bits, even parity, no stop bits, and full duplex. Then dial 800-346-3247 with your modem. When the modem connects, press Enter. At the HOST NAME prompt, enter PHONES. Follow the menus and note the closest access number. Or dial 800-635-6225 (voice) and follow the instructions.

HOW TO JOIN ZIFFNET Dial the local access number. At the HOST NAME prompt, enter CIS. At the USER ID prompt, type 177000,5000. When you see the PASSWORD prompt, enter PC*MAGNET. Finally, when you see the ENTER AGREEMENT NUMBER prompt, enter PCMAG94. Current CompuServe members can type GO PCMAG at any CompuServe ! prompt. Once you enter your billing information, you'll see your personal user ID and temporary password.

MEMBERSHIP PRIVILEGES Membership costs \$2.95 per month. As a ZiffNet member, you receive free access to *PC Magazine* Editors' Choice awards, Product Reviews Index, weekly news from *PC Week*, Buyer's Market, ZiffNet Highlights, the Support Forum, and the current utility (type GO ZNT FREEUTIL). For other services, connect-time charges vary according to the speed of the modem used. Billing is based on 1-minute increments. You can also download all of *PC Magazine's* utilities and tips. Just type GO ZNT TIPS.

FREE UTILITY You can download this month's utility, free of charge, from *PC Magazine's* BBS by dialing 617-231-4450 with your modem. Just enter your name at the prompt and follow the menus.

NO MODEM, NO PROBLEM If you don't have a modem, you can get our utilities by mail. Just send your request with your name, address, and preferred disk size to Public Brand Software, P.O. Box 51315, Indianapolis, IN 46251; fax, 317-856-2086.

COPYRIGHT INFORMATION The programs presented in *PC Magazine* can be copied but are copyrighted. You may make copies for others if no charge is involved, but making copies or using any portion for any commercial purpose is strictly prohibited.

PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

Hardware

GRAPHICS BOARDS FOR DOS SYSTEMS

How do I find out about the graphical performance of DOS applications? Most graphics-board reviews I see are based on accelerators for Windows. Can you give me advice on boards optimized for DOS?

*William Hudson
Portland, Oregon*

► **PC MAGAZINE:** While it's true that the spotlight today is on Windows graphics performance, *PC Magazine* has not yet abandoned the examination of DOS graphics performance. Although WinBench 4.0's Graphics WinMark scores evaluate Windows graphics performance, PC Bench 8.0's DOS video score provides a measurement of DOS-based applications' graphics performances. Thus, you should be able to find the numbers you seek in the reviews right here in *PC Magazine*.

In general, DOS applications are not designed to take advantage of the accelerator functions used by Windows. As a result, you're likely to find some of the best DOS graphics-performance results among the cards that rely on enhanced frame-buffer technology. Since this approach relies heavily on the rapid transfer of large amounts of data from the CPU to the graphics adapter, local-bus implementations have an edge in the performance results. At the moment, some of the VL-Bus cards based on Tseng Laboratories' 4000/W32 chip appear to be among the top performers, but as with all aspects of performance in this rapidly changing market, that is subject to change.—*Alfred Poor*

IMPRACTICAL UPGRADE

How can I upgrade my older computer to run newer software, such as Windows? Upgrading is my only choice since I can't afford a new computer.

*Margaret J. Briscoe
Edmond, Oklahoma*

► **PC MAGAZINE:** This is one of the most frequently asked questions about older, 8088/8086-based PCs. Unfortunately, the answer is that the cost of upgrading such a system to the point where it can run Windows is extremely close to the price of a new system.

The reason is that few (if any) components from the original system can be used with an upgraded system. A minimum-level platform for Windows requires at least an 80386DX/20 CPU with 2MB of memory and a 40MB hard disk. (A 386DX/33 computer with 4MB of memory and an 80MB hard drive will be significantly better and doesn't cost much more.) You can find a complete system, including a color VGA monitor, for between \$600 and \$900.

To upgrade, you'll need a new motherboard (if you can find one to fit your existing case) with a new CPU and new memory. You won't be able to use your existing memory on the new mother-

board. Memory will cost about \$250 for a 2MB system. The 10MB or 20MB hard disks found in most XT-class machines are too small, so you must buy a new one. You can figure about \$125 for a 40MB, IDE hard disk, assuming that the replacement motherboard includes an IDE port, and you'll have to add another \$10 for an interface card. Next, most of these older systems use monochrome displays, and although you can run Windows with a Hercules monochrome graphics card or compatible, most Windows users want color. That requires at least a VGA graphics adapter and a color monitor, for which you can figure a minimum of \$250. Already, you're close to the cost of a new system, and you haven't yet addressed the problems of the power supply (which isn't big enough to handle these new components) or the keyboard (which most likely will not work with the new motherboard). Furthermore, you'll need at least one new floppy disk drive to handle the newer, high-capacity floppy disks that are the current standard.

On top of all this, there's the "hassle factor." If you buy these components and install them yourself in your old case, you become responsible for making them work together. If the system doesn't boot up, whom do you call? The place where you bought the motherboard? The dealer

PC SOLUTIONS INDEX

Hardware

Graphics Boards for
DOS Systems.....299
Impractical Upgrade.....299

Operating

Environments

Sound Advice.....302
Doublespace Doesn't.....302

Word Processing

Replacing Sysedit.....305

Spreadsheets

Tracking a Moving Cell...305
Finding the Frequency...305

Databases

Using FoxPro's
TEXTMERGE to
Generate Source Code...312



PC DIRECT
starts here
with
exciting
offers from
top direct
vendors.

See index, page 303.

MORE SCREAM MACHINE



DELL DIMENSION™ XPS P60 PENTIUM® 60MHz SYSTEM

\$2499* | BUSINESS LEASE[†]
\$92/MO.

ORDER CODE #500011

- 8MB RAM
- 128MB MAX RAM
- 450MB HARD DRIVE
- 256KB EXTERNAL CACHE
- 7 EXPANSION SLOTS TOTAL
(4 ISA, 1 PCI, 1 PCI/ISA
SHARED AVAILABLE)
- PCI VIDEO CARD
- VSI4 MONITOR
(14" CRT, 1024 x 768, .28mm, NII)
- ONE DISKETTE DRIVE (3.5")
- SPACESAVER KEYBOARD
- MS-DOS® 6.2/MICROSOFT®
WINDOWS™ 3.1/MOUSE



DELL DIMENSION XPS P90 PENTIUM 90MHz SYSTEM*

\$2999* | BUSINESS LEASE[†]
\$111/MO.

ORDER CODE #500013

- 8MB RAM
- 128MB MAX RAM
- 450MB HARD DRIVE
- 256KB EXTERNAL CACHE
- 7 EXPANSION SLOTS TOTAL
(3 ISA, 1 PCI, 1 PCI/ISA
SHARED AVAILABLE)
- PCI VIDEO CARD
- VSI5 MONITOR
(15" CRT, 1024 x 768, .28mm, NII)
- ONE DISKETTE DRIVE (3.5")
- SPACESAVER KEYBOARD
- MULTI-SESSION, DOUBLE-SPIN
CD ROM DRIVE
- MS-DOS 6.2/MICROSOFT
WINDOWS 3.1/MOUSE



Respondents ranked Dell "Highest in Customer Satisfaction among Desktop Personal Computer Users."

*This device has not been approved by the Federal Communications Commission. This device is not, and may not be, offered for sale or lease or sold or leased until the approval. Study conducted among 1,956 business user respondents. *Prices valid in the U.S. only. Some products and promotions not available in Canada. †Business leasing arranged by Leasing Group, Inc. interest in the marks and names of others. ©1994 Dell Computer Corporation. All rights reserved.

MINING S.

[NO SCREAMING
CUSTOMERS.]



DELL DIMENSION XPS P90 PENTIUM 90MHz SYSTEM*

\$3299*

BUSINESS LEASE
\$122/MO.

ORDER CODE #500012

- 8MB RAM
- 128MB MAX RAM
- 528MB HARD DRIVE
- 256KB EXTERNAL CACHE
- 7 EXPANSION SLOTS TOTAL
(3 ISA, 1 PCI, 1 PCI/ISA
SHARED AVAILABLE)
- PCI #9GXE VIDEO CARD

- VS15 MONITOR
(15" CRT, 1024 x 768, 28mm, NII)
- ONE DISKETTE DRIVE (3.5")
- SPACESAVER KEYBOARD
- MULTI-SESSION, DOUBLE-SPIN
CD ROM DRIVE
- MS-DOS 6.2/MICROSOFT
WINDOWS 3.1/MOUSE

Unlike the other guys, we didn't just shove a Pentium processor into any old 486. Seemed like designing from the microprocessor up made more sense. The experts call it optimization. We call it designing a bunch of screamin' meanies.

DELL™

CALL **800-937-1460** NOW

HOURS: MON-FRI 7AM-9PM CT SAT 10AM-6PM CT SUN 12PM-5PM CT
IN CANADA* CALL 800-668-3021 KEYCODE #118LR

of the FCC has been obtained. *Promotional pricing expires 5/15/94. Ⓢ Denotes a cool feature which makes this system scream even more. 1993 J.D. Power and Associates Desktop Personal Computer Satisfaction. The Intel Inside and Pentium Processor logos and Pentium are trademarks of Intel Corporation. MS-DOS and Microsoft are registered trademarks and Windows is a trademark of Microsoft Corporation. Dell disclaims proprietary

from whom you bought the hard disk? You become your own technical-support team, since there is no one else who will take responsibility for the entire system.

Finally, what would you end up with by upgrading? You'd have a new computer installed in an old case, when for about the same money, you could have a new computer in a new case and still have your old computer intact. Don't overlook the fact that your old computer can still do useful work for you or for someone else. So offset the cost of a new system by having the older unit available as a backup or selling it to someone else.—*Alfred Poor*

Operating Environments

SOUND ADVICE

❓ The several hundred users of our Token-Ring network have grown to love the sounds Windows 3.1 offers. But when we installed the HP Network Advisor to look at the LAN, we saw an abnormal number of congested receivers. We finally narrowed down the problem to the speaker driver (SPEAKER.DRV), which Win-

dows uses to generate sounds on the PC speaker. It turns out that in order to get good sound quality, the driver has to disable just about every interrupt, which also seems to stop the computer from passing the token in the network. But setting the driver to allow interrupts produced garbled sounds. In the best interests of the network, we had to ban the use of any sounds using SPEAKER.DRV. Network Advisor shows a nice clean network now, but our users are really unhappy. Is there another driver that would work better?

*Rick Durso
Brewster, New York*

HOW TO CONTACT US

Do you have a hardware, software, or systems problem you can't solve? Do you have a tip you think other readers could use? Or maybe you'd like a better understanding of how something works. If so, we invite you to let us know about it. Our experts can give you practical solutions to your problems, provide techniques for using your software and hardware more productively, and help you grasp computer concepts and understand the latest technology.

It's easy to contact us. Just send us your submission (use ASCII format for text files) via the medium that's most convenient for you:

U.S. Mail: Solutions, *PC Magazine*, One Park Ave., New York, NY 10016-5802. (Please send a floppy disk along with a printout.)

Fax: 212-503-5799.

MCI Mail: Solutions, 556-3896

CompuServe Mail: 72241,104.

PC MagNet: Select Submissions to PC Magazine from the main PC MagNet menu. Upload your file to the most appropriate library. If at any time you need help, simply type a question mark (?) and hit Enter; a list of commands will be displayed. If you are not already a member of PC MagNet but would like to join, follow the instructions on page 12 to find your local access number.

CompuServe Members: If you're a CompuServe member, you can join PC MagNet by typing GO PCMAG at any CIS prompt.

For any tip we print, you'll receive \$50 plus a *PC Magazine* T-shirt. We regret that we cannot answer letters individually.

Our Advisors

Douglas Bolling is a contributing editor and the author of many utilities, including MBOOT.COM and EMS40.SYS.

Frank J. Derfler, Jr., is senior networking editor and the author of the *PC Magazine Guide to Connectivity*.

Alfred Poor is a contributing editor and the author of *New Life for Old PCs*.

Jeff Prosser is a contributing editor and the author of the *PC Magazine Guide to DOS 5 Memory Management*.

Sai Ricciardi is a contributing editor and the author of the recent *Running FoxPro* books from Microsoft Press.

Neil Rubenking is technical editor and author of *Can Do DOS*,

Can Do Windows, and *PC Magazine Batch File Lab Notes*.

Joe Salemi is a contributing editor and author of the *PC Magazine Guide to Client/Server Databases*.

Luisa Simone is a contributing editor and the author of the book *Microsoft Publisher*.

Craig Stinson is a contributing editor and coauthor of *Running Windows 3.1* and *Running Microsoft Excel*.

M. David Stone is a contributing editor and coauthor of *Word for Windows Companion*, Second Edition.

Ethan Winer is a contributing editor and the author of *PC Magazine BASIC Techniques and Utilities*.

► **PC MAGAZINE:** The SPEAKER.DRV driver was originally going to be integrated into Windows 3.1, but in the end Microsoft decided not to include it. You can download it, but it's not part of Windows 3.1. Why? You've discovered the reason yourself: The only way to get halfway decent sound from the built-in PC speaker is to disable all interrupt processing while the sound is being played.

There's not much any program can do with the built-in PC speaker. You can program the speaker to emit a single tone at a given frequency, or you can turn it on and off. Playing waveform audio through the speaker requires turning it on and off very rapidly—so rapidly that pausing to process interrupts garbles the sound. Thus, by default, SPEAKER.DRV disables interrupts, and any other software-only solution will have the same problem.

In order to give your users multimedia sound capability, you're going to have to upgrade their hardware. Even the cheapest sound card lets Windows play sound effects without the slightest effect on interrupt processing. Perhaps you can get a volume discount!—*Neil J. Rubenking*

DOUBLESPEACE DOESN'T

❓ I recently purchased DOS 6.0 and have a few questions about the DoubleSpace program that came with it.

I ran DoubleSpace on an empty 1.44MB floppy disk. Then I used CHKDSK and DBLSPACE /INFO, and both reported 2.6MB free and 2.6MB total space on my disk. I copied a 615K game to the disk and ran CHKDSK and DBLSPACE /INFO again. Under CHKDSK, my total dropped to 2.19MB and my free

space dropped to about 1.5MB. DBLSPACE /INFO reported total space of 2.09MB and 1.49MB free. I copied the game to the floppy disk again under a different name. This time CHKDSK reported about 1.5MB total and 248K free, while DBLSPACE /INFO indicated 1.45MB total space with .24MB free.

My conclusion is that after using DoubleSpace on a 1.44MB floppy disk, I will only be able to put 1.44MB of files on the disk. From this conclusion, my guess is that after running DoubleSpace on my 108MB hard disk, I'll only be able to fit 108MB worth of files on the disk. My questions about DoubleSpace are why did the total space of my disk drop, and is there any way to uncompress my hard disk?

*Devang Patel
Federal Way, Washington*

► **PC MAGAZINE:** This letter is typical of the many questions readers have about DoubleSpace, except that it's been researched better than most. The important thing to remember about free space on Double-

Space drives is that it is an estimate, nothing more. The amount of compression DoubleSpace can achieve for a given file is completely dependent on the file itself. Text files will often compress by a 5 to 1 ratio or better, while files already compressed by some other method may not compress at all. DoubleSpace estimates free space based on an average compression ratio of 1.8 to 1.

Total space is calculated by taking the actual space occupied by files and adding the estimated free space. Thus, if you add a file whose actual compression ratio does not match the estimate, your total space will seem to change. In your case, it seems that the 615K game file was already compressed. As you filled the floppy disk with copies of this file, the compression ratio for the whole disk sank to barely above 1 to 1. Note that the /C switch for the DIR command will display the compression ratio for each file and the average compression for all files displayed.

In general, you *can* expect a compression ratio closer to the average of 1.8 to 1. If you store a lot of compressed archives,

image files in compressed format, or other files that can't be compressed further, the average compression will drop. On the other hand, if you store a lot of text files or uncompressed image files, you may get a ratio better than 1.8 to 1.

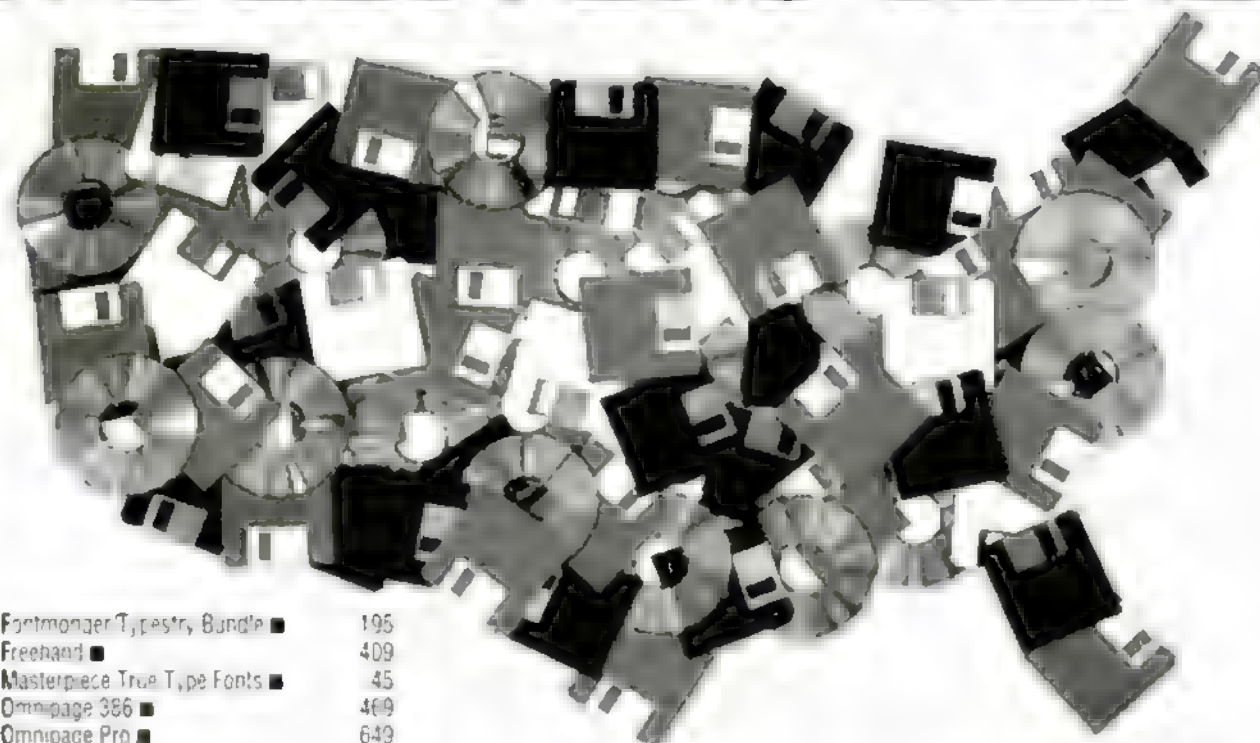
As for uncompressing a disk, there's no automatic way to do it. For a compressed floppy disk, copy the data, unmount the disk using the DBLSPACE program, quick-format the disk, and copy the data back to it. For a compressed hard disk, the safest technique is to shrink repeatedly the compressed drive as much as possible using the DBLSPACE program, and then move files from the compressed drive to the corresponding uncompressed drive. When you've moved all your files off the compressed drive, use DBLSPACE to remove the drive. If you're willing to live dangerously, you can back-up the data, remove the compressed drive, and restore the data onto the uncompressed drive.

Even if you remove all of your compressed drives, the DBLSPACE.BIN driver will still load at boot time, taking up

Premier Superstores Top Direct Marketers Manufacturers of Systems, Software, and Peripherals If it's sold direct, you'll find it here.		INDEX <table border="0"> <tr> <td colspan="2"> SYSTEMS AMS343 Comtrade358 COMPUTER DISCOUNT WAREHOUSE405 Dell Computer Corp.....300 E.P.S Technology316 Expo Tech328 Insight Distribution Network344 Midwest Micro Peripherals.....349 NCR Corp.317 PCs Compleat.....360 USA Flex.....354 </td><td colspan="2"> COMPUTER DISCOUNT WAREHOUSE405 DEE ONE SYSTEMS313 Dustin Discount Software304 First Source International334 Global Horizons, Inc.....333 H. Co Memory Upgrades314 Kenosha Computer Center336 LA Trade.....341 Megahaus367 Memory Direct368 Midwest Computer Works.....322 Network Express340 PC Connection308 Pinnacle Micro311 Publishers Toolbox364 Publishing Perfection321 Sunshine Computers.....348 Valueline332 Zykel315 </td></tr> <tr> <td colspan="2"> SOFTWARE/PERIPHERALS/ COMPONENTS Amdek.....366 American Small Business.....365 Arlington Computer Products.....325 Bulldog Computer Products.....342 Compuserve337 Computability306 </td><td colspan="2"></td></tr> </table>		SYSTEMS AMS343 Comtrade358 COMPUTER DISCOUNT WAREHOUSE405 Dell Computer Corp.....300 E.P.S Technology316 Expo Tech328 Insight Distribution Network344 Midwest Micro Peripherals.....349 NCR Corp.317 PCs Compleat.....360 USA Flex.....354		COMPUTER DISCOUNT WAREHOUSE405 DEE ONE SYSTEMS313 Dustin Discount Software304 First Source International334 Global Horizons, Inc.....333 H. Co Memory Upgrades314 Kenosha Computer Center336 LA Trade.....341 Megahaus367 Memory Direct368 Midwest Computer Works.....322 Network Express340 PC Connection308 Pinnacle Micro311 Publishers Toolbox364 Publishing Perfection321 Sunshine Computers.....348 Valueline332 Zykel315		SOFTWARE/PERIPHERALS/ COMPONENTS Amdek.....366 American Small Business.....365 Arlington Computer Products.....325 Bulldog Computer Products.....342 Compuserve337 Computability306			
SYSTEMS AMS343 Comtrade358 COMPUTER DISCOUNT WAREHOUSE405 Dell Computer Corp.....300 E.P.S Technology316 Expo Tech328 Insight Distribution Network344 Midwest Micro Peripherals.....349 NCR Corp.317 PCs Compleat.....360 USA Flex.....354		COMPUTER DISCOUNT WAREHOUSE405 DEE ONE SYSTEMS313 Dustin Discount Software304 First Source International334 Global Horizons, Inc.....333 H. Co Memory Upgrades314 Kenosha Computer Center336 LA Trade.....341 Megahaus367 Memory Direct368 Midwest Computer Works.....322 Network Express340 PC Connection308 Pinnacle Micro311 Publishers Toolbox364 Publishing Perfection321 Sunshine Computers.....348 Valueline332 Zykel315									
SOFTWARE/PERIPHERALS/ COMPONENTS Amdek.....366 American Small Business.....365 Arlington Computer Products.....325 Bulldog Computer Products.....342 Compuserve337 Computability306											

DUSTIN DELIVERS HERE. FREE!

DOS ●
WINDOWS ■
MPC +
O/S2 ◆
MAC ▲
HARDWARE ★



ACCOUNTING & FINANCE

CA BPI Accounting 2 ●	165
Money ■	55
M.Y.O.B. ■	119
Peachtree Accounting Release 2 ■	125
Peachtree Complete 7.0 ●	195
Profit ■	135
Quicken 6.0 ●	49
Quicken 3.0 ■	CALL
Simply Accounting ●■	135
Timeclock + 3.0 ●	195
Timeclock + Payroll Import ●	49

BUSINESS GRAPHICS

Action Comp. Upgrade ■▲	99
Action ■	349
Action ▲	349
allClear ●■	195
CA Cricket Paint ■	99
CA Cricket Presents ■	99
Flowcharting III ●	145
Freelance Graphics ●■	CALL
Freelance Graphics Upgrade ●■	109
Harvard Graphics 2.0 ■	249
Harvard Graphics ●	399
Inform ■	CALL
Perform Pro ●	195
Perform Pro Plus ■	259
Powerpoint ■	325
Powerpoint Upgrade ■	129
Visio 2.0 ■	CALL
Visio Home ■	85
WP Presentation ●	295

CAD & DRAFTING

Autosketch 3.0 ●■	CALL
Design CAD 3D ●	259
Drafix CAD ■	319
Generic 3D Drafting ●	215
Generic CAD 6.0 ●	295
Turbo Cad ■	85

COMMUNICATIONS & NETWORKING

Crosstalk 2.0 ■	115
Crosstalk Communicator ●	65
Hyperaccess 5 ●	69
Hyperaccess 5.0 ●	135
Laplink Pro 5.0 ●	109
Netware ●■★	CALL
PC Anywhere Host/Rmt ●	CALL
Pro Utilities ●	69
Procomm Plus ●	79
Procomm Plus ■	99
Q-Modem ●	69
Server On-Off ●	129
Smartcom ■	49
Windows For Workgroups ■	CALL
Wildcat BBS ●	89
Winfax Pro ■	89
WordPerfect Office PC ●	95

DATABASE & DEVELOPMENT

Access ■	CALL
Approach ■	CALL
CA Clipper 5.2 ●	509
CA Clipper 5.2 Comp. Upgr. ●	149
CA dBase ■	195
dBase IV ●	519
FileMaker Pro ■	135
Foxbase + ●	CALL
Foxpro 2.5 ●■	519
Paradox 4.0 ●■	CALL
Paradox Upgrade ●■	CALL
Q & A 4.0 ●	265
Q & A 4.0 ■	175
Rbase ●	CALL
Superbase V2.0 ■	469

DESKTOP PUBLISHING & FONTS

Express Publisher ●■	109
Facelift For WP ●	69
Facelift ■	69
Fontmonger ■	105

Fontmonger Typestry Bundle ■	195
Freehand ■	409
Masterpiece True Type Fonts ■	45
Omnipage 386 ■	469
Omnipage Pro ■	649
Publisher 2.0 ■	139
Pagemaker ■	529
Printshop Deluxe ●	55
Type Align ■	69
Type Mgr ■	69

EDUCATION & TRAINING

Auto Insight ●■	55
Automap Europe ●	65
Automap ●■	65
Autoworks ●	47
Body Insight ●■	55
Body Works ●	43
Chemistry Works ●	43
City Streets ●	69
Complaints Desk ●	99
Computer Works ●	35
Kid Pix ●■	45
Orbits ■	33
PC Insight ●■	55
PharmAssist ●	47
Places to Play ●	45
Sales and Marketing ●	59
Success Inc. ●	85
Typing Tutor VI ●■	39
UFO ●	47
Where Is Carmen-World Deluxe ●	55

GAMES & ENTERTAINMENT

Capitalist Pig ■	45
Comanche Overkill ●	35
Entertainment Pack #1 ■	35
Falcon 3.0 ●	55
Flight Simulator 5.0 ●	CALL
Links PRO 386 ●	49
Manhole ●	39
Playmaker Football ●	39
Rodney ●	39
Simcity ●■	39
Thrustmaster ★	89

GRAPHICS & CLIPART

Apprentice ■	89
Color Wheel ■	199
Corel Draw 3 ■	139
Corel Draw 4 ■	399
Corel Draw 4 Version Upgrade ■	239
Effects Specialist ▲■	109
Graphics Composer ■	265
Graphics Editor ■	399
Harvard Draw Upgrade ●■	CALL
Hijaak ●	105
Hijaak Pro ■	89
Illustrator ■	389
Painter ■	275
Photoshop ■	589
Presentation Task Force ●■	129

INFORMATION & PROJECT MANAGEMENT

1st Act ●■	59
Act! ●■	279
Ascend ■	149
Commence 2.0 ■	265
Descriptions Write Now ●	95
French Assistant 5.0 ●	65
German Assistant 5.0 ●	65
Italian Assistant 5.0 ●	65
Lotus Organizer ■	109

Manage Pro 2.0 ■	239
Packrat 5.0 ■	259
Planmaker ●■	59
Policies Write Now ●	125
Power Translator (French) ●	179
Power Translator (Spanish) ●	179
Project ●	329
Project ■	455
Spanish Assistant 5.0 ●	65
Timeline 5.0 ●	455

INTEGRATED

Claris Works w/Quicken ■	105
MS Office ■	489
MSOffice Pro ■	619
Simply Business Bundle ■	425
Smart Suite ■	CALL

MATHEMATICAL

Derive 2.0 ●	155
Mathematica DOS Enhanced ●	735
Mathematica DOS Standard ●	489
Mathematica Windows Enhanced ■	819
Mathematica Windows Standard ■	489

MODEMS

Hayes Accura 14.4 Ext. ★	249
Hayes Accura 14.4 Int. ★	229
PM14400FX Send/Rec Fax ★	219
Sportster 14.4 Int. ★	199
Sportster 9600 ★	CALL
WorldPort 9600 ★	419

OPERATING SYSTEMS

MS DOS 6.0 Upgrade ●	59
Windows 3.1 ■	99
Windows 3.1 Upgrade ■	59
Windows NT ■	CALL
Windows for Workgroups ●	CALL



Plain Wrap Prices,
Black Tie Service.

20969 Ventura Blvd., Woodland Hills, CA 91364 (818) 710-9174

Call Toll Free To Order

1-800-765-6214

Fax Your Order 24-hours

1-818-884-5310

Normally stocked items purchased from Dustin that are unopened and undamaged may be returned within 30 days. All such returns, including those covered by a money-back guarantee, are subject to a 15% restocking fee and a \$5 handling fee. Defective products will be exchanged for the same title only. We do not guarantee compatibility. All returns must be accompanied by a Return Authorization number. While ground shipments are free, we do ask \$11 per item for 2-day, \$22 per item for overnight, and \$5 for C.O.D. Heavier items may be slightly more. Shipping and handling charges are non-refundable. All prices are subject to change without notice. Check orders may be held up to 10 days.

CIRCLE 347 ON READER SERVICE CARD

CD-ROM SOFTWARE

BUSINESS SOFTWARE	
Corel Draw 3.0 ■	139
Corel Draw 4.0 ■◆	399
Global Explorer ■	99
MM Powertalk +	35
Pro Phone 1993 ●	115
Publish It Easy ●	115
Publish It! 2.0 ●	75
Street Atlas USA ■	99

CLIPART & GRAPHICS

Corel Clip Art ■▲	CALL
Publisher's Paradise ●■	35

EDUCATION & TRAINING

Animals +	55
History of the World ■◆	55
Mavis Beacon Teaches Typing ●◆	49
Monarch Notes ●▲	49

ENCYCLOPEDIAS

Grolier's MM Ency. Upgrade ●■	99
Grolier's MM Encyclopedia ●■	199

ENTERTAINMENT

20th Century Video Almanac ●	55
Conan ●	29
Dune ●	59

Funny: The Movie +	35
Hell Cab ●	69
Inca-CD ●	49

King's Quest VI ●	49
Legend of Kyrandia ■	49
Loom ●	39

Oceans Below +	35
Scrabble ■	35
Seventh Guest ●	59

Space Shuttle ●■	35
------------------	----

GENERAL REFERENCE

Auto Insight ●■	55
Beatles Hard Days Night +	35
Body Insight ●■	55
Cameron's Fine Art +	39

Human Calculator +	45
Information USA ●	69
MS Bookshelf 1993 ■	139

Sports Almanac +	45
The Animals ■	55
Time Table of History ●	59

U.S. Atlas +■	39
US Presidents ●■◆	39
World Atlas +■	39

MUSIC SOFTWARE	
MS Beethoven +	59
MS Musical Instruments +	59

Soundsations +	CALL
----------------	------

SHAREWARE & UTILITIES	
Gold Collection ●■◆	25
Matinee +	39

CD-ROM HARDWARE	
ACCESSORIES	

CD Caddies (6-pack) ★	39
SCSI Card (8-Bit) w/Ext Cable ★	79
SCSI Card (16-Bit) ★	199

CD-ROM DRIVES	
NEC CDR-74 ★	599
NEC CDR-84 ★	495

Procom DS External ★	299
Procom DS Internal ★	249
Procom DS PRO External ★	569

Procom DS PRO Internal ★	479
--------------------------	-----

MULTIMEDIA KITS	
DS Series Drive and 16-Bit Sound Card Int ★	369

DS Series Drive and 16-Bit Sound Card Ext ★	419
Multimedia Station Ext ★	519

Multimedia Station Int ★	469
Multimedia Station Pro Ext ★	799

Multimedia Station Pro Int ★	749
PRO Series Drive and 16-Bit Sound Card Int ★	649

PRO Series Drive and 16-Bit Sound Card Ext ★	699
--	-----

SOUND CARDS	
Pro Audio Spectrum 16 ★	179

Pro Audio Studio 16 ★	235
Sound Blaster 16 ASP ★	239

Sound Blaster 16 ★	179
--------------------	-----

THE DUSTIN DIFFERENCE

Free Ground Shipping • Same Day Shipping

Overnight Delivery Available • PO's Welcome

Government & Educational Pricing

Visa, MC & AMEX Accepted

THE DUSTIN DIFFERENCE

No Credit Card Surcharges

Credit Card Not Charged Until Shipping

Manufacturers' Warranties

Call for Any Items Not Listed

about 44K of RAM. To remove DBLSPACE completely after emptying and removing all compressed drives, first check your CONFIG.SYS file. If it contains a line like `DEVICEHIGH=C:\DOS\DBLSPACE.SYS /MOVE`, delete that line. Now switch to the root directory of your boot drive, issue the command `DELTREE /Y DBLSPACE.*`, and reboot. If you decide to reinstall DoubleSpace at a later time, the program will re-create the DBLSPACE.BIN file.

—Neil J. Rubenking

Word Processing

REPLACING SYSEDIT

TIP Although Windows' Sysedit utility lets you quickly open, edit, and save SYSTEM.INI, WIN.INI, CONFIG.SYS, and AUTOEXEC.BAT files, its minimal editing capabilities make it frustrating to use. Without a search-and-replace function, for example, you can't update these vital Windows files easily when you move a program to a different directory. And Sysedit's inability to open additional files means you can't cut and paste or compare before and after file versions after installing a program.

My recommendation is to replace Sysedit with DESKEDIT.EXE, The Norton Desktop's editor. Assuming you have Windows on drive C: and The Norton Desktop for Windows in the NDW directory of drive D:, you can then enter the following on a single command line:

```
D:\NDW\DESKEDIT.EXE
C:\WINDOWS\WIN.INI
C:\WINDOWS\SYSTEM.INI
C:\AUTOEXEC.BAT C:\CONFIG.SYS
```

This gives you the multifile access of Sysedit and provides more editing features as well.

Helen Bell Fedema
Kerhonkson, New York

►PC MAGAZINE: Many readers are probably unfamiliar with Sysedit, the special-purpose text editor that Windows automatically installs in your WINDOWS\SYSTEM directory. When it

starts, Sysedit loads the four files it's designed for, but it makes no provision for loading any others.

Ms. Fedema's alternative to Sysedit is not limited to Norton Desktop users, however. The same multifile opening technique is also available in Word for Windows 2.x and 6.0 and in WordPerfect 6.0 for Windows. If you're not sure whether your favorite word processor will open multiple files with a single command, it does no harm to try. If it doesn't, it may (like WordPerfect 5.x) offer a macro feature you can use in order to automate loading the four files.

On the other hand, by using a relatively lean program such as The Norton Desktop's editor, you won't spend eternity waiting while the files load.

—M. David Stone

Spreadsheets

TRACKING A MOVING CELL

❓I'm using Quattro Pro 5.0 for Windows and need to be able to reference in a formula the bottom, or most recent, cell entry in a column. This cell might contain the current balance in a bank-account register whenever a new transaction is posted in a personal bookkeeping program, for example. The problem is that the cell to be referenced in the formula moves down one row with each new transaction. Is there a way to do this?

David Watson
Aurora, Oregon

►PC MAGAZINE: You can use QPW's @INDEX function to retrieve the value stored at a particular column, row, and page within a specified range. The function has the syntax

```
@INDEX(Block, Column, Row, <Page>)
```

Note that the positional numbering for each argument begins at 0, not at 1. That is, the first item in a row, column, or page is identified as 0, the second as 1, and so on. The Page argument is optional; if it's omitted, QPW uses the current page.

So, for example, the formula

```
@INDEX(A1..D20, 2, 7)
```

returns the value stored at C8 on the current page. To get the value of the tenth cell in a single-column range named Balance, you would use

```
@INDEX(Balance, 0, 9)
```

And the following formula would return the bottom value in a single column named Balance:

```
@INDEX(Balance, 0, @ROWS(Balance)-1)
```

Since @INDEX requires the *n*th item to be identified as *n* - 1, you simply need to subtract 1 from the value returned by @ROWS.

For all of this to work in your application, you must identify your range by name and ensure that after each new transaction your name definition expands to include the newly entered data. If you are already driving your application with a macro, you can simply incorporate an additional routine to update the name definition. A snippet of code such as the following will do the trick:

```
{goto}Balance~
{Shift+End}
{Shift+Down}
{Ctrl+F3}Balance~
```

The {Shift+End} and {Shift+Down} commands extend the current selection downward to include the last cell in the current block, and {Ctrl+F3}Balance assigns the name *Balance* to the current selection.—Craig Stinson

FINDING THE FREQUENCY

❓Can you help me to create a formula in Lotus 1-2-3, Release 2.4, that would calculate the six most frequently occurring numbers in a range covering seven columns by *n* rows?

R. B. Patell
New York, New York

►PC MAGAZINE: What you need is a frequency-distribution table sorted in descending order of frequency. You can easily create such a table with 1-2-3's /Data Fill, /Data Distribution, and /Data Sort

Since 1982 ComputAbility Consumer Electronics



PMG 5-17 toll free fax: 800-554-9981
800-554-9930
WINNER
OF EIGHT BEST BUY AWARDS!

COMPUTERS

DESKTOP

PC CARD SET
Force 203 486 SX/33 4MB/210MB \$865
Force 2386 Plus 486 DX/33 8MB/420MB \$1,759
Force 2010 Plus 486 SX/25 4MB/120MB \$1,199
Force 2000 Multimedia 486 SX/33 4MB/120MB \$1,279

NOTEBOOK

EPSON
SPECIAL OFFER!
Includes Epson
20MB Flash Ram
PCMCIA card:
High performance 486DX/33 processor,
local bus video and 210MB hard drive
700C, dual-scan passive matrix color LCD \$3,335
700CX, active matrix color LCD \$3,989

High performance 486DX/33 processor,
local bus video and 210MB hard drive
700C, dual-scan passive matrix color LCD \$3,335
700CX, active matrix color LCD \$3,989



SEE OPPOSITE PAGE FOR MORE
NOTEBOOKS!

NETWORKING

NOVELL
Novell V 3.12 Authorized Dealer
5 User PC (\$629-\$59)CD (\$629-\$59) \$625
10 User PC (\$629-\$59)CD (\$629-\$59) \$1,419
20 User PC (\$629-\$59)CD (\$629-\$59) \$2,099
25 User PC (\$629-\$59)CD (\$629-\$59) \$2,839
Novell Peer to Peer Authorized Dealer
Personal Network Single User (5702-15) \$85
Personal Network 5 User (5702-16) \$255
Starter Kits for 2 Users (5702-17) \$235
Expansion Kits to add 1 User (5702-18) \$145

ARTISOFT
LANtastic 6.0 Network SW 1 User (\$695-118) \$74
LANtastic 6.0 Network Starter Kit (\$695-122) \$325
Node Runner 2000C Adapter \$165
Node Runner 2000C Starter DOS/WIN \$409/\$465
Node Runner SI2000C Coax / 5 Ft. \$99/\$379
Node Runner SI2000T Coax / 5 Ft. \$95/\$379
AI DosWin \$77/\$89
Simply LANtastic Add-on Kit \$53
Simply LANtastic Starter Kit \$189

10Base-T
3Com Etherlink III 16 bit (8674-12) \$115
SMC Ultra Elite 16 bit (7890-21) \$99
Net. Informer NE2000+ T 16 bit (5702-05) \$79
Intel EtherExpress 16 Flash (4384-35) \$115
COAX
3Com Etherlink III 16 bit (8674-08) \$115
SMC Ultra Elite 16 bit (7890-18) \$99
Net. Informer NE2000+ C 16 bit (5702-08) \$89
Intel EtherExpress 16 Flash (4384-08) \$115

10Base-T
3Com Etherlink III 16 bit (8674-54) \$136
SMC Ultra Elite 16 bit (7890-21) \$99
Net. Informer NE2000+ 16 bit (5702-11) \$119
Intel EtherExpress FlashC 16 bit (4384-36) \$125
FDDI
Net. Informer NE4100C 1 16 bit
Coax (5702-13) \$185
Net. Informer NE4100T 1 16 bit
10Base-T (5702-03) \$185

CALL FOR SPECIAL QUANTITY PRICING
SYNOPTICS
10B-T, 16 Port 2800A Asst Non Managed
(8386-01) \$638
10B-T 2813-04 Asst 4 Exp. Ports (8386-02) \$1,729
10B-T 2803 Asst, Term & Exp. Ports
(8386-03) \$729

SMC
10B-T, 8 RJ45 + 1 Asst Port (7890-42) \$329
3512 TP 10B-T with 12 RJ-45 \$599

3COM
LinkBuilder FMS TP Hub
12 RJ45, 1 Asst Stackable (8674-38) \$829
24 RJ45, 1 Asst Stackable (8674-39) \$1,079

ALLIED TELESIS
AT-MR10T-15 Asst 4 10B-T Micro Hub
External P/S (0396-01) \$329
Internal P/S (0396-02) \$195
AT-MR10T-15 Asst 4 10B-T Micro Hub
External P/S (0396-03) \$359
Internal P/S (0396-04) \$209

PRINTERS

EPSON
Action Laser Printer 1000 2MB \$639
Action Laser Printer 1000 1MB \$635
Stylus 800 Ink Jet (925 rebate) \$249*
Stylus 300 Ink Jet - NEW
AP 3280 / with color \$195/\$239

NEC
Stentwriter M85 6ppm PS \$865
M85fx (M85 w/FAK) \$1,079
Stentwriter 1087 \$1,349
SuperScript 610 \$899

Primera
High resolution thermal transfer printing. Great
for presentations & overheads \$895

OKIDATA
ML320 / ML321 \$299 / \$419
580 / 591 \$419 / \$589
385 / 386C \$949 / \$1,019
610 / 630 / 660 \$809 / \$1,079 / \$949
400s / 410s \$499 / \$839

QUANTITIES LIMITED
Star 2430 Black \$205
NX-2450 / NX-2480 Rainbow \$225 / \$249
Star SJ 144 NEW! \$459

TEXAS INSTRUMENTS
microMatrix Ink Jet \$245*
microWriter Basic, 5PPM Laser \$609
microWriter PS23 5PPM w/PS \$679
microLaser Pro 600 PS23 \$1,259*
*Price reflects rebate! Good thru 6/30/94!

Canon
BJ200C / BJ230 Ink Jet \$289 / \$385
BJ105X / SJ 600 Color Ink Jet \$239 / \$575
LBP 400 Laser \$285
LBP 860 Laser \$1,379

MODEMS

NEW LOWER PRICES!
**Free Prodigy Starter Kit with
purchase of any Zoom Modem!**
V.32 bis Send/Receive 14,400 for DOS or Win
Internal / External \$125 / \$145
w/ Voice Int. Ext. \$145/\$169
Zoom 14.4 PC w/ Voice \$189 / \$265
V. Fast Class 2.4 fpa \$169/\$189
VFP 24K Int. VFX 24K Ext. \$169/\$189
V Fast Class 2.8 Int. Ext. \$209/\$219
Zoom 14.4 PC Int/Ext \$99/\$129

Supra Corporation
SupraFaxModem Internal 24/96 NEW! \$63
Supra 2400 External \$59
SupraFaxModem 144LC, Class 1 only
External DOS / Windows \$149
SupraFaxModem V.32 bis, Internal
with FaxSoftware DOS/WIN \$135
SupraFaxModem V.32 bis, Ext. alone \$189
with Fax Software, DOS/WIN \$199
with Fax Software, Mac \$215
Supra Com Card, PCMCIA
14/414.4, S/R, Free Delivery! \$289
SupraFaxModem 288/288 Ext. \$229/\$285

Robotics
Sportster 14.4 Int. / with Fax \$145 / \$149
Sportster 14.4 Ext. / with Fax \$159 / \$169
Courier V.32 Turbo Int. / with Fax \$325 / \$339
Courier V.32 Turbo Ext. / with Fax \$375 / \$389
WinFax Plus (Call WinFax)
Cellular Fax PCMCIA Free Delivery \$399
14.4 Fax Modem Int/Ext \$159/\$199

AT&T
14.4 Fax Modem Int/Ext \$149/\$185
AT&T Notebook, PCMCIA 14.4 FREE DEL. \$299
AT&T DataPort 20001 \$399

intel
14.4 Fax Modem Int/Ext \$159/\$199

AT&T
14.4 Fax Modem Int/Ext \$149/\$185
AT&T Notebook, PCMCIA 14.4 FREE DEL. \$299
AT&T DataPort 20001 \$399

TAPE BACK UP

COLORADO
MICROMETER SYSTEMS INC.
JUNDO - Low Cost Tape Backup
DJ10-120M \$105
DJ20-250MB \$159
DJ25-500MB CALL
JUNDO TRACKER - External Parallel Printer
Port Tape Backup System:
JT1040-120 \$269
JT20 (80-250) \$315
POWERPAGE SYSTEM:
Includes Colorado Backup for DOS software
2GB Int. / Ext. Free Delivery! \$945 / \$1,029
PT110 525MB Tape Backup Int. \$895

HARD DRIVES

Seagate
ST-251 1 MFM \$239
ST-3120A IDE \$165
ST-3145A/3243A IDE \$179/\$205
ST-3390N SCSI \$399
ST-3290A/390A IDE \$219/\$275
ST3414/3655A IDE \$369/\$399
FREE DELIVERY:
ST-3655N \$549
ST-3550N / 31200N SCSI \$469 / \$795
ST-11200N / 1900N \$799/\$1,149
ST-11950N / 12400N \$1,539/\$1,469
ST-12550N / 42100N \$1,729 / \$1,399
ST-42400N / 43400N \$1,599 / \$2,009

Maxtor
IDE 7131A/7245A/7345A \$185/\$235/\$269
IDE 7273A \$339
IDE 7548A - FREE DELIVERY \$599
SCSI 7290S \$279

Quantum
ELS 170 IDE / SCSI \$199 / \$209
LPS 270 IDE / SCSI \$239 / \$249
540 IDE / SCSI FREE DELIVERY \$499 / \$499
PB 1800 SCSI FREE DELIVERY \$1,089

MICROPOLIS
FREE DELIVERY (contiguous 48 states)
1926 / 1936 SCSI \$1,399/\$2,099
2210 / 2217 SCSI \$859/\$1,169
2210A / 2217A IDE \$859/\$1,169
2210AV / 2217AV \$899/\$1,269

WESTERN DIGITAL
AC-1210 / AC-2250 \$199/\$225
AC-2340 / AC-2420 \$285/\$309
AC-2540 \$419

CONTROLLERS

Adaptec
1622 SCSI Direction Kit \$135
1542CF Single \$195
1542CF SCSI Master Kit / PLUS \$249/\$305
121 Mini SCSI \$65
2747K K4 NewSingle NEW \$349/\$319
2842 VL Master Kit \$299
Sim SCSI, APA-480, PCMCIA, Free Del. \$299
AVA 16 bit SCSI/CD ONLY \$95/\$59

FAST
FastSCSI ISA/PL \$129/\$139
FastSCSI VESA Local/PL \$185/\$205
FastSCSI PCMCIA \$195
FastSCSI HD-PCI \$319

FUTURE
TMC-850 MCD CD ROM Kit \$55
1680 SVP-ISA
TMC-850 MCD CD ROM Kit \$55
1680 SVP-ISA, 16 bit SCSI 2 with floppy
support & CD ROM SCSI support \$129
TMC 3200 PCI \$139

OTHER
Seagate ST-02 SCSI 8 Bit Adap. w/FD Cont. \$45
DTK PTI 227, 2 Serial, 1 parallel
1 game port, 1 floppy disk controller,
1 embedded hard disk drive adapter \$29

SPEAKERS

YAMAHA
Yamaha Digital Speakers (YST101H) \$69
AC-3 NEW! \$175
ACS-50 / 150 \$72 / \$109
ACS-100 / 300 \$125 / \$289

ACUSTIC RESEARCH
AR Partner 22 Black/42 Gray \$75/\$149
AR Partner 570 Gray/622 Gray \$279/\$219

PLUG & PLAY

MicroSolutions
No Slot Drive, requires AC!
Backup CD ROM Double Speed \$359
Backup 250 Tape Drive \$345
Backup Deskette Drive 1, 2, 5, 25 \$195
Backup Deskette Drive 1, 4, 3, 5 \$145
Backup Hard Drive 340 \$449
Backup 2.8 Floppy Drive \$189

MONITORS

CTX
5439A, 14" 5468A, 14" \$205/\$249
1451N, 14" 1461, 14" \$265/\$295
1560, 15" 1561LR, 15" \$395/\$399
1760LR, 17" Flat, 31DP 1280x1024, NI \$679

SONY
CPD-1430
CPD 1320 UC2, 14", 640 x 480 VGA \$335
CPD 1430S, 14", 1024 x 768, NI \$549
8514A, 25 MM, cables & stand \$585
CPD 1730S, 17" 1024 x 768, NI, Free Del \$1,039
CPD 175EL 17", Free Delivery! \$1,229

NEC
Multisync 4FGe
SVGA 14" 5FGe, 17" \$305/\$655
3PG, 27" - NEW! \$2,785

NANAO
F3401W - F3501 \$669 / \$689
F560W - F560W \$1,085 / \$1,335

NOKIA
Multisync 449E
448S, 14" 449E, 15" \$419/\$515
447B, 17" \$549

SCANNERS

Canon
IX 4015 Color Scanner SCSI with interface
Includes Olo software \$909

RELISYS
AVEC 3 Pass, Flatbed, Color Scanners
2400 PC Omni Scan/Photoshop \$999/\$999
4800 PC \$999
Real Single Pass, Flatbed, Color Scanners
2400 PC / 9800 PC \$1379 / \$2779

LOGITECH
Scanman 256 (gray scale) \$165
Scanman 256 with Omni Page Direct \$209
Scanman Color with Omni Page Direct \$429
PhotoMan Plus \$529
Scanman Easy Touch/Power Page \$215/\$469

EPSON
*FREE Software!
\$50.00 rebate!
ActionScanning System PC \$749
ES-8000 Bundle \$999
*ES-8000 Professional PC Bundle \$1,199
*Chargem from MicroGraphs
*Total Value of Package - \$499.00
**OFFER GOOD 5/1-7/91

POWER SUPPLY

TRIPLE
Smart 400 / 500 / 600 \$279 / \$309 / \$335
Smart 750 / 900 / 1250 \$429 / \$529 / \$659
Power Alert Plus Novell/Unix \$62/\$105
Power Advisor DOS \$62
BC Series Standby UPS Systems
BC 250/BC 400/BC 500 \$95/\$149/\$179
BC 400LAN/BC 500LAN \$149/\$189
BC 600LAN/BC 750LAN \$245/\$289
BC 800LAN \$345

OmniPower Line Interactive UPS
OMNI 500LAN/OMNI 600LAN \$249/\$295

LOWER PRICES!
Back Ups
250 / 400 \$90 / \$155
450 / 600 \$185 / \$255
900 / 1250 \$365 / \$489
Smart Ups
370 / 400 \$309 / \$285
600 / 800 / 1250 \$335 / \$535 / \$689

FLOPPY DRIVES

Floppy Drives
3.5" without Frame 1 44MB PC/AT \$55
TEAC
All Media Floppy
The All-In-One 3.5" & 5.25"
Half Height Internal Floppy Drive \$125

PCMCIA

**FREE Delivery on all PCMCIA
MODEMS**

Intel S/R 14.4 \$265
Hayes Optima S/R 14.4 \$309
AT&T Keep In Touch S/R 14.4 Cell \$299
US Robotics World Port S/R 14.4 \$245
Megahertz XJ1144 S/R 14.4 \$309
Megahertz XJ2144 S/R 14.4 \$329
Supra ComCard S/R 14.4 \$289

FLASH CARDS:
EPSON
Flash Card 5/10/20MB \$329/\$469/\$639

NATIONAL SEMI CONDUCTOR
InfoMover NE 4100T, 10BT \$159
InfoMover NE 4100MC-1 Coax \$189

3COM
Etherlink 3TP \$245
Etherlink 3 Combo \$295

CONTROLLERS:
Adaptec Slim SCSI \$289
New Media Bus Toaster w/SCSI II cables \$259
Socket SR 700 I/O Card \$189

TOKEN RING:
IBM PCMCIA 16/4 TokenRing \$365

MEMORY CARD:
New Media Sram 1MB Type 2 \$159
New Media Sram 2MB Type 2 \$279

HARD DRIVES:
Maxtor 105MB Type 3 - FREE DEL. \$479
Minstor MP 65/170 w/Stacker \$279
Minstor MP 128/256 w/Stacker \$279
Seagate ST-7050P \$339

SOUND CARDS:
Turtle Beach Audio Advantage PCMCIA \$99
New Media WAVjammer \$249

MISCELLANEOUS:
PCMCIA for your DT-Dockit Socket \$189

MULTIMEDIA

ADS
VGA TV Elite Int. / Ext \$185 / \$229
TV Elite AV NEW \$249
Game Zapper \$95

CREATIVE LABS
WAVE Blaster \$179
Scanman Color with Omni Page Direct \$429
Video Spigot \$245
TV Color \$129

SCIMA DESIGNS
Real Magic / SCSI Version \$379 / \$429
Win Storm \$175
Real Magic CD ROM Kit \$799

TURTLE BEACH
Maus w/variable synthesizer upgrade \$159
Tahiti \$259
Crescendo FREE DELIVERY \$399
LOGITECH
Movie Man \$215

SEE OPPOSITE PAGE FOR MORE MM PRODUCTS!

VIDEO BOARDS

DIAMOND
Speedstar Pro, 1MB / VLB \$115 / \$115
Stealth 1MG \$199
Stealth 24 ISA / VLB \$155 / \$155
Stealth Pro, ISA, 1MB / 2MB \$239 / \$239
Stealth Pro, VLB 1MB / 2MB \$245 / \$329
Stealth 32 VLB 2MB \$239
Video VLB 2MB / PCI 2MB \$385 / \$409
Video Star \$325
Video Star Pro - FREE DELIVERY \$499

VGA Wonder GT Windows Accl. \$185
ATI Graphics plus 2MB \$229
ATI Ultra Pro 2 MB / VLB \$349 / \$349
ATI Ultra Pro ISA 2MB \$375

GIGABYTE
GIGABYTE PCI 1MB / 2MB \$175 / \$249
GIGABYTE VLB 1MB / 2MB \$175 / \$249
GIGABYTE Pro PCI \$365
GIGABYTE 1230 x 1024 NI SVGA
LV1 10, 1MB ISA / VLB \$239/\$249
LV1 11, 2MB ISA / VLB \$349/\$349
LV1 12, 3 MB ISA/VLB \$429/\$429
LV1 14, 4MB \$629

BEST SELLING NOTEBOOKS!

SEE OPPOSITE PAGE FOR MORE NOTEBOOKS!



TOSHIBA

New!

T1950 CS Dual Scan Passive 486SX/33	
40MHz, 200MB Hard Drive	\$2,750
T3400 CT Active Matrix Color 486SX/33	
40MHz, 120MB Hard Drive	\$3,499
T4700 CT Active Matrix Color-Dockable 486/DX2	
50MHz, 320MB Hard Drive	\$4,989
T4800 CT Active Matrix Color Intel 486/DX4	
75MHz, 500MB Hard Drive	\$5,689

TEXAS INSTRUMENTS

TravelMate 4000, 486 SX25	
Adv. Color 4MB/120MB	\$1,949
TravelMate 4000, 486 DX2/50	
200MB Dual Scan	\$3,049
TravelMate 4000, 486 DX2/50	
Active Color 4MB/200MB	\$3,799
TravelMate Desktop Intelligent docking System	\$799
TravelMate 4000E WinDX 4/75, 340MB	\$4,449
TravelMate 4000E WinDX4/75, 455MB	\$4,959

EPSON

Action Note	
4SLC2/50, 486 SLC/50 4MB	
80MB / 120MB	\$1379/\$1519
180MB 180MB without Modem	\$1619 1489
Action Note 4000 SubNotebook	
486 SLC/33, 4MB	
80MB / 120MB / 180MB	\$1,285/\$1,319/\$1,359
Action Note 500C, 486 SLC2/50, 4MB - pass. col	
120MB / 180MB	\$1,929/\$2,009
Epson 700 Mono 120MB / 210MB	\$1879/\$1959
Epson 700C Dual Scan Passive	
120MB / 210MB	\$2409/\$2509
Epson 700CX Active Matrix	
120MB / 210MB / 260	\$3049/\$3159/\$3209

NEC

Versa E: 486SL DX2, 4MB, Active Matrix Color	
40EC, 40MHz, 120MB / 250MB	\$3,819 / \$4,229
50EC, 50MHz, 209MB / 340MB	\$4,499 / \$4,919
75EC: 486 DX4 75MHz, 340 MB	
Active Matrix Color	\$5,249

P.O. Box 17882
Milw, WI 53217

- One of Wisconsin's Top 10 Women Owned Businesses.
- Corporate, Government & School POs Welcome.



- No Surcharge on Credit Cards.
- Most Orders Shipped within 48 Hours.
- Software Shipping only \$6 per order, not per title.
- Hardware: 5% - Min. \$5.
- C.O.D orders welcome, with only a \$6.00 Charge.
- We Ship Latest Version of Software Available.
- All Products Sold Carry Manufacturers' Full Warranties & Documentation.
- APO, FPO HI, AK Puerto Rico & Canadian orders welcome: 6% - Min. \$6.
- International Orders Shipped First Class Mail Insured: 15% - Min. \$15. If mail cost exceeds calculated amount, you'll be billed additional. Note: UPS to AK or HI may run more than 6%.
- If so, you will be billed additional.
- Call for Free Catalog & Items Not Listed

Personal & company checks allow 14 working days to clear. Prices fluctuate beyond our control & may change for better or worse. Not responsible for typographical errors. Defective returns must have a Return Authorization number. Call our 1-800-554-9981 to obtain a Return Authorization or your return will not be accepted. Shipping & handling are non-refundable. All sales are final. All returns are subject to a restocking fee.

*Free delivery applies only to the contiguous 48 states

ComputAbility Exclusive CD ROM Bundles!*

CD ROM Drive & Interface Options	BARE DRIVE	8 Bit SCSI Interface	16 Bit SCSI-2 Interface	Pro Audio Spectrum 16	Pro Audio Studio 16	Sound Blaster SCSI-2	Sound Blaster SCSI-2 ASP	7 Title MPC Bundle
Chinon 535 Int.	\$305	\$349	\$430	\$435	\$455	\$489	\$519	add \$79
Chinon 535 Ext.	\$395	\$425	\$520	\$545	\$565	\$599	\$629	add \$79
Mitsumi FX001D	\$175 (with Sound Blaster 16 MPC = \$310 or 16 MCD ASP = \$344)							add \$79
NEC 3XI	\$459	\$519	\$584	\$589	\$609	\$643	\$673	add \$79
NEC 3Xe	\$539	\$599	\$664	\$689	\$709	\$743	\$773	add \$79
NEC 4X	\$939							add \$79
Plextron 3028i	\$279	\$339	\$404	\$409	\$429	\$463	\$493	add \$79
Plextron 5028e	\$379	\$439	\$504	\$529	\$549	\$583	\$613	add \$79
Sony CDU-33A	\$169 (with Sound Blaster 16 MPC = \$304 or 16 MCD ASP = \$338)							add \$79
Toshiba 3401B Int.	\$315	\$375	\$440	\$445	\$465	\$499	\$529	add \$79
Toshiba 3401E Ext.	\$415	\$475	\$540	\$565	\$585	\$619	\$649	add \$79
Toshiba 4101 Int. NEW!	\$209	\$269	\$334	\$339	\$359	\$393	\$423	add \$79

*Add \$79 Special 7 Title MPC Bundle includes:

- Toolworks Multimedia Encyclopedia
- Chessmaster 3000
- Mavis Beacon Teaches Typing MPC
- US Atlas MPC
- World Atlas MPC
- Animals MPC
- Mono is Missing MPC

*Prices good with the Purchase of any CD ROM Drive or Upgrade Kit (at time of purchase only)

CD-ROM BUNDLE RAMA

Chess Master 3000MM MPC Pro CIA World Tour Clip Media II Clipsart Warehouse Classic Movie Clips - Horrors - Science Fiction - Trailers Spectacular - Various Vozes Complete Bookshop Coolbook Heaven Desktop Arcade Dinosaur Adventure Eco Quest Encyclopedia of Sound Eternam Game Arena Garbo	Gardening Graphic Animation Festival V.1 Graphic Textures Gunnies Book of Records '93 MPC HAM Radio Hugo's House of Horrors Interactive Storyline V.1 or 2 It's A Wonderful Life Jokes & Pranks King Quest 5 Kodak Photo CD Access Learn Learn in The 80's MacMillan Childrens Dictionary Magazine Rack Mono is Missing Deluxe Mavis Beacon 3.0 MPC	Mayo Clinic for Windows Mixed up Mother Goose Monkey Island MultiMedia Audio Collection National Geographic Materials New Basics Electronic Cookbook Oceans Below MPC PC Sig 12th Edition Peter & the Wolf ProPhone Bus. Ed. DOS Return to Zork Right College by Arto ROM Material Secret Weapons of the Luftwaffe Selectware Jukebox Software Vault II Solar System Sound Effects Library	Space & Astronomy Space Quest 4 Space Shuttle MPC Sports Illustrated Almanac Star Wars Chess MPC Time Table of History Science & Innovation Too Many Typefaces Toolworks Ref. Library US Atlas V.4 w/ Video MPC US Atlas with Autopilot US Presidents Wave Pool Window Wars Wing Commander/Ultime V1 World Atlas V.4 w/ Video MPC	Accessories to add to your Bundle (each item at our rate) CD Caddy 4 Pack Portable CD Case holds 20 ea. CD Cleaning System CD Lens Cleaning System Digital Headphones Sound Master Volume Control CD3 CD Storage - holds 48 CDs *With the purchase of any CD-ROM Drive or Upgrade kit from ComputAbility buy 3 for \$59 or 5 for \$99 *Offer good at time of purchase only!
--	--	---	--	--

Where the Top 50 Software Titles are Always on Super Sale!

1 MS Word 6.0 for Windows 299.95	14 After Dark for Windows V.2.0 29.95	27 Corel Draw 3.0 for Windows 124.95	40 WordPerfect for 6.0 Windows 284.95
2 MS DOS 6.2 49.95	15 MS Publisher 2.0 for Windows 122.95	28 Clans File Maker Pro 2.1 119.95	41 Lantastic AI 5.0 Win/DOS 77.95
3 MS Excel 5.0 for Windows 304.95	16 Disney Screen Saver for Win. 28.95	29 TurboTax 1040 Final for Dos or Win. 41.95	42 MS Windows for Workgroups 3.11 137.95
4 MS Power Point 4.0 for Windows 304.95	17 MS Office 4.0 for Windows 459.95	30 Quattro Pro 5.0 for DOS 42.95	43 Compuserve Win Membership 26.95
5 WordPerfect 6.0 DOS 284.95	18 Norton Utilities 7.0 111.95	31 Quicken 3.0 for Windows 41.95	44 MS Visual Basic 3.0 for Win Stand 124.95
6 Lotus 123 Release 4 for Windows 294.95	19 MS Flight Simulator 5.0 43.95	32 MS Arcade 1.0 for Windows 28.95	45 Rebel Assault - CD 45
7 Paradox 4.5 for Windows 138.95	20 Quicken 7.0 for DOS 42.95	33 ViSio 2.0 for Windows 119.95	46 Lotus Notes 3.0 Client for Win 409.95
8 Quern 7 62.95	21 WinFax Pro 3.0 for Windows 78.95	34 Encarta Encyclopedia - CD 89	47 MS Money 3.0 for Windows 24.95
9 Quattro Pro 5.0 for Windows 42.95	22 PC Anywhere V.4.5 Host & Remote 112.95	35 Corel Draw 4.0 for Windows 374.95	48 MS Visual C++ Stand for Win 3.5 124.95
10 MS Windows 3.1 88.95	23 Approach 2.1 for Windows 97.95	36 Quicken Companion 2 24.95	49 MS Cinemas 34 - CD 53
11 Procomm Plus 1.02 for Windows 93.95	24 Print Cache 3.1 46.95	37 MS PC Works 3.0 for DOS 94.95	50 Netware Lite 89.95
12 MS Access 1.1 for Windows 299.95	25 OS/2 2.0 for Windows 49.95	38 Hitach Pro Windows 79.95	
13 Procomm Plus 2.01 for DOS 68.95	26 MS Works 3.0 Win 119.95	39 MS Windows NT 3.1 299.95	

see below for MORE GREAT SOFTWARE TITLES!

Pro Spectrum 16 Basic 995	TURTLE BEACH
Pro Audio Spectrum 16 1115	Audio Advantage PC/MCA Free Del 899
Pro Audio Studio 16 1135	Mau Waveable Synthesizer Upgrade 1159
	Wave for Windows 74.95
	(w/ purchase of any Sound Card) 539
	OTHER
	Advanced Gravis UltraSound 1129
	Logitech Soundblan 16 1105
	Logitech Soundblan Wave 16 1182
	MS Sound System 2.0 w/ board 1179
	Diamond Sonic Sound 1215
	Digispeech Portable Sound 1145
	Roland SC-7 Sound Canvas Module 1319
	RAP-10 Roland Audio Prod. Free Del 1489
	Orchid Gamewave/Soundwave 32 1145/\$1219

COMPAQ

11417 Contura 4/25C Color Notebook—

Full-powered computing for the road, in living color! Features an energy-efficient 25MHz 486SL processor, internal 8K cache, 4MB of RAM (expandable to 20MB), and integrated numeric coprocessor for full 486DX performance without loss of battery life. It also features a 9.5" Advanced Passive Matrix display with 16 colors and 640x480 resolution. NiMH battery delivers up to 3.5 hours of life. Comes with 209MB Drive and Compaq Trackball



\$2599.

11420 Contura 4/25 Mono 209/w 2099.

11418 Contura 4/25C 120/w 2299.

COMPAQ

11415 Contura 4/25CX Active Matrix Color 209 w—

Now you can have superior portable color at a superior price! In fact, the Contura won the first-ever PC Laptop Computers "Value Award." It features an energy-efficient 25MHz 486SL processor with an internal 8K cache and 4MB of RAM, expandable to 20MB. The 8.4" Active Color Matrix display delivers 16 vibrant colors at 640 x 480. The NiMH battery provides 2.5 to 3 hours of life. Built-in Easy Point Trackball eliminates the need for separate pointing device. Comes with a 209MB Drive (while supplies last).



\$3299.

11416 Contura 4/25CX 120w (w.s.l.) 3029.

COMPUTERS

Monitors not included with systems.

Compaq Computer ... 3 years

13553	Concerto 4/25 w/250MB, Windows	\$2099
11420	Contura 4/25 w/209MB, Windows	2099.
11417	Contura 4/25C w/209MB, Windows	2599.
11418	Contura 4/25C w/120MB, Windows	2299
	Contura 4/25CX, Windows (while supp. last)	
11416	120MB... 3029. 11415 209MB...	3299
2016	LTE Lite 4/25 w/120MB, Win. (w.s.l.)	2049.
Texas Instruments TM 4000E Systems		
13312	WinDX 2/50 Mono w/200MB	2479.
6441	WinDX 2/50 Active Matrix 200MB	3799.
8934	WinSX/25 Mono w/120MB	1729.
1620	WinDX 4/75C	4529.
Toshiba Satellite Laptops		
13953	T1950CS Passive Color 200MB	2699.
14354	T4700CS Passive Color w/200MB	3999.
14355	T4700CS Passive Color w/320MB	4329.
14344	T1950 Mono w/200MB	2099
14350	T4600 Mono 200MB (while supp. last)	2199.

BUSINESS APPLICATIONS

Aldus		
14335	TouchBase for Windows	29 95
Borland International		
6788	Quattro Pro 5.0 for Win. (3 1/2" only) while supplies last	44.95
10710	Paradox 4.5 for Win. (3 1/2" only)	145.95
Camt		
4274	OmniPage 386	319.95
8933	OmniPage Pro 2.1	489.95
Clarisc Corporation		
6022	ClansWorks/Quicken (while supp. last)	95.95
5257	FileMaker Pro Windows 2.1	119.95
5228	FileMaker Pro Win.Comp. Upgrd.	95.95
Delrina		
2682	The FarSide Daily Planner	39.95
Intuit		
	Quicken for DOS or Windows ea.	42.95
Lotus		
5982	SmartSuite 469.95 11771 Upg.	299.95
2756	1-2-3 4.0 - Win. (2755 5 1/4")	309.95
3428	1-2-3 4.0 - Win. Upg. (3424 5 1/4")	99.95
5005	Freelance Graphics 2.0 (3523 5 1/4")	349.95
MECA ... 60 day MBG		
2798	Manag. Your Money 10.0 (3 1/4" only)	34.95
Microsoft		
14146	MS-DOS 6.2 Upgrd. for Dummies	47.95
7009	Windows 3.11 (7010 5 1/4")	95.95
12707	Windows NT (3 1/4" & CD incl.)	319.95
7811	Word for Windows 6.0	299.95
2931	Access for Win. 1.1 (2932 5 1/4")	299.95
8138	Office 4.2 for Win. (8137 5 1/4")	479.95
MicroTae Software		
	Span, Ital, Fren or Germ Assist. ea.	54.95
Peachtree		
12287	Accounting for Win Release 2	115.95
Software Marketing		
9504	AutoWorks	39.95
12714	PharmAssist Windows	39.95
Software Publishing		
4402	Harvard Graphics 2.0 (4403 5 1/4")	279.95

WordPerfect

12914 WordPerfect for Windows 6.0A—Produce more professional documents in less time. Easily combine text, graphics, and charts. Enhanced formatting and print speed, font and graphics support, plus many new features.

\$299.95

12963 6.0A Version Upgrade 99.95

Voted Best Mail-Order Company by PC World Readers three years in a row!



We carry more than 3500 products! If you don't see something listed, just call. Version numbers are current at press time. Products listed in red are Microsoft Windows Applications.

Unless indicated by (CP), all software is not copy-protected.

Harvard Graphics

SOFTWARE PUBLISHING CORP.

4402 Harvard Graphics for Windows 2.0—Makes creating compelling presentations easy! Features powerful graphing, charting, drawing, text tools, presentation management, & more. **\$279.95**

9759 Upgrade 89.95

Symantec

1625	ACT! DOS 2.11	\$264.95
7435	ACT! Windows 2.0 (3 1/2" only)	259.95
Timeslips		
12638	Timeslips Release 5 for Windows	189.95
3-D Visions		
8883	Stanford Chart for Win. (3 1/2" only)	58.95
WordPerfect Corporation		
3445	Presentations 2.0 (while supp. last)	135.95
3795	WordPerfect 6.0 DOS	279.95
12914	WordPerfect for Windows	299.95
	WordPerfect DOS or Win Ver. Upg	99.95

GRAPHICS & DESIGN

AbraCadabra, Ltd.		
13046	Design Own Home - Arch. Windows	31.95
Adobe Systems		
10774	Adobe Photoshop	589.95
6439	Adobe Illustrator	449.95
Aldus		
13791	PageMaker 579.95 6678 Upg.	145.95
1085	FreeHand for Win. (3 1/4" only)	395.95
Altamira		
15573	Composer	529.95
Altaya Corporation		
12979	Fontomatic for Windows 1.0	38.95
8675	Fontographer for Windows 3.5	259.95
Corel Systems		
11895	CorelDRAW! 4.0	275.95
Elseware Corp.		
15885	FontWorks!	79.95
Fractal Design		
4356	Painter 2.0 259.95 13218 X2	93.95
HSC Software ... 30 day MBG		
12887	Digital Morph 1.0 (3 1/2" only)	89.95
13956	Kai's Power Tools Windows	124.95
Inset Systems		
3820	Hijack PRO 2.0 for Win. (3 1/4" only)	84.95
Micrografix		
3628	Windows Draw! 3.0 (3627 5 1/4")	49.95
Microsoft		
10051	Font Pack 2 Windows	45.95
North Coast Software		
15884	Morphology	28.95
6992	PhotoMorph 1.0 for Windows	89.95
Shapeware		
15714	Visio Express for Microsoft Office	49.95
5426	Visio 2.0 for Win. (3 1/4" only)	119.95
T/Maker		
4680	Incredible ImagePak Windows	89.95
15062	Studio Ser. Design Group CD-ROM	189.95
U-Lead Systems		
14894	Image Pals II	119.95

NETWORKING/COMMUNICATIONS

Asanté Technologies Hubs ... 5 years		
2775	8 Port 249.95 2772 12 Port	499.95
Artisoft		
15595	Simply LANtastic Starter Kit	199.
14742	Simply LANtastic Add-on Kit	99.95
BOCA Research ... 5 years		
8397	M1441W FaxModem	119.95
8398	M144EW FaxModem	149.95



Call for our latest catalogs.



Shapeware \$49.95

15714 Visio Express for Microsoft Office—Create professional-quality charts, diagrams, and other business graphics in Microsoft Word, Excel, and PowerPoint. Access award-winning drag-and-drop drawing capabilities from your application toolbar!



Image Systems

3820 Hijack PRO 2.0 for Windows—Use virtually any image, anywhere! Convert 70+ image formats. Capture screens. Browse image "thumbnails." Supports OLE, JPEG, PhotoCD, TWAIN, cross-platform conversions, more! **\$84.95**



PC Connection®

800-800-0004

594PCM

6 Mill Street, Marlow, NH 03456
SALES 603-446-0004 FAX 603-446-7791

**75MHz
Breakthrough!**

Texas Instruments

1620 *TravelMate 4000F WinDX/75C*—Enjoy notebook speed, power and color without compromise! This portable speed demon is based on a superfast 75MHz 486DX4 processor—fast enough to leave most desktop systems in the dust. It comes with 4MB RAM (standard, expandable to 20MB). The display is an 8.4-inch Active Matrix Color VGA with 256 colors in 640 x 480. The WinDX/75 supports external monitors up to 1024 x 768 resolution at 1200 x 1024 w/16 colors. Includes Ballpoint Mouse with QuickPort, the new 4mm full-travel keyboard, and a 340MB Drive.

\$4529.

1623 *TravelMate 4000F WinDX/75C w/ 455MB Drive & 5" display* 5045.

Coactive Computing

14025 Connect DOS & Win 1.0 (3 1/2") \$134.95
14028 Starter Pack 1.0 (3 1/2" only) 189.95

Data Storm

4798 PROCOMM PLUS 2.01 69.95
2006 PROCOMM PLUS 2.01 Windows 95.95

DCA/Crosstalk

5611 Crosstalk 2.0 for Windows 99.95

Deirina Technology

2446 WinFax PRO 3.0 79.95
14072 Communications Suite 114.95

Hayes ... 2 years

11396 ACCURA 144-FAX144 (external) 169.95
11397 ACCURA 144-FAX144 (internal) 159.95

12820 OPTIMA 288-FAX144 449.95

8167 OPTIMA 144-FAX144 PCMCIA 289.95

Hilgraves

12081 HypAcc Win 109.95 8204 DOS 59.95

IBM

13207 FaxModem (int.) (P/N MOD531) 49.95
14534 PCMCIA Ethernet Card 10BASE-T 175.

Intel ... 3 years

2994 EthExpress 16 or 3021 16 TP ea. 99.95
1531 FaxModem 14.4/14.4 (int.) 159.95

1536 FaxModem 14.4/14.4 (ext.) 179.95

5994 SatisFAXtron Modem/400 285.95

12934 14.4 PCMCIA FaxModem 299.95

8903 2400 bps Wireless Modem 649.95

Megahertz ... 5 years

10515 C5144 14.4 FaxModem (Compaq) 419.95
12763 XJ1144 14400 FaxMod (PCMCIA) 309.95

Microcom ... 30 MBG

6234 CarbonCopy for DOS 129.95
4410 CarbonCopy for Windows 129.95

14931 DeskPorte FAST 28.8 ES 249.95

Microsoft

5743 Windows for Workgroups 3.11 144.95
6172 Windows for Workgroups (single) 47.95

Norton-Lambert

2754 Close-Up Host & Remote 5.0 119.95

Novell Netware 4.01

(10 user) ... 2069. 12056 (25) 3049.

Practical Peripherals ... lifetime

10570 PM14400FX MT 189.95
9234 PM14400FXPPM Pock. Fax/Mod. 299.95

2425 PM14400FX SA 399.95

6123 PrachCARD 144 (PCMCIA card) 289.95

Shiva

14837 NetModem/E 1.5 1479.

Selectek

13083 AirLan Bridge 3449.95

Starter Kit (ISA or MCA) ... ea.

1369.95

Texas Instruments

14288 *TravelMate 4000F WinDX/25C*

DualScan Color Notebook—50MHz 486DX2 with coprocessor, 8K cache, 4MB RAM, 9.4" passive matrix color VGA 640x480, 1MB VideoRAM, 200MB drive, 1.44MB floppy Trackball, 6.3 pounds.

\$3039.

Texas Instruments

15128 *TravelMate 4000F WinDX/25C Color*

Notebook—Just 6.3 pounds! 40MHz 486DX2 with coprocessor, 4MB RAM (expandable to 20MB), 9.4" VGA display with 256 colors, 200MB drive, Ballpoint mouse w/QuickPort connection, preinstalled Windows.

\$2689.

Central Point Software

12833 PC Tools Pro 94.95

13395 PC Tools for Windows 89.95

6161 XTree Gold DOS (3 1/2" only) 95.95

8957 XTree for Windows 64.95

Clarix Clear Choice

13219 ImageMaster Win (screen saver) 34.95

Darimana Software

9442 WinSleuth Gold Plus 96.95

DataViz, Inc.

6508 Conv. Plus for Win 1.0 (3 1/2" only) 89.95

Deirina

9853 Opus n.Bill Screen Saver 29.95

Helix Software

9627 Netroom 3 (single user) 59.95

Howlett-Packard

8731 Dashboard 2.0 for Windows 48.95

Kent Marsh, LTD

8262 FolderBolt for Windows (3 1/2" only) 55.95

McAfee Associates, Inc.

14761 VirusScan DOS or 14760 Win 94.95

MicroHelp, Inc.

14787 Uninstaller for Windows (3 1/2" only) 39.95

Microsoft

10154 Visual Basic Std 129.95 10437 Pro 119.95

11504 Visual C++ Pro 1.5 (CD only) 399.95



MICROCOM

14931 *DeskPorte FAST ES 28.8*

FaxModem—Experience 28.8 data transfer speeds up to 115,200 bps! MNP 10 for optimal reliability. 5 yr. warranty. Twice the speed of 14.4!

\$249.95

14932 *DeskPorte FAST EP* 339.95

14949 *FAST* 479.95 14930 *14.4 ES* 199.95

Supra ... 5 years

5252 144LC FaxModem 149.95

11441 144e FaxModem 209.95

Traveling Software

4407 LapLink V 109.95

U.S. Robotics

11923 Sportstar 14.4 FaxModem int. 159.95

11924 Sportstar 14.4 FaxModem Ext. 184.95

6631 WorldPort 14.4 PCMCIA FaxMod 319.95

11922 WorldPort 14.4 Pocket FaxMod. 249.95

Zoom Telephonics ... 7 years

9519 FaxModem VFP 24K (internal) 175.95

14763 FaxModem VFP 28.8K (internal) 209.95

15364 FaxModem VFX 28.8 (external) 229.95

4428 FaxModem VFXV 32 bis (ext.) 149.95

4429 FaxModem VFPV 32 bis (int.) 124.95

PROGRAMMING & SYSTEM UTILITIES

Berkeley Systems

14890 Marvel Comics Screen Posters 19.95

6642 Distort Col. Seta Saver (3 1/2" only) 29.95

3528 After Dark 2.0 for DOS (3 1/2" only) 29.95

12030 More After Dark Win 3.1 23.95

6649 Star Trek Screen Saver (3 1/2" only) 29.95

After Dark

Desktop art and screen saver images featuring Spider Man, the X-Men, Captain America, The Hulk and more!

Includes milestone Marvel covers and classic confrontations.

\$19.95

3528 *After Dark* for DOS 29.95

VIDEO & SOUND

Adobe Systems ... 120 day MBG

12891 Premiere 1.0 for Win (3 1/2" only) 179.95

Advanced Digital Systems

13985 VGA TV-Elite 249.95 (internal) 229.95

Alicia Lansing Speakers

12924 ACS50 69.95 15691 ACS300.1 239.95

Aristosoft, Inc.

6780 Wired for Sound Pro 2.0 39.95

ATI Technologies ... 5 years

3886 Graph. Ult.+2MB 249.95 3871 Pro 369.95

11022 Graphics Ultra Pro EISA (w/2MB) 399.95

Clarix Clear Choice

13907 From Alice to Ocean (Book & CD) 46.95

Creative Labs ... 1 year

5770 Sound Blaster 16 MCD ASP 199.95

Diamond Computer ... 5 years

1569 Stealth 24 VLB 159.95

1585 Viper VLB 399.95

Hauptpage

10593 Win/TV w/Microsoft Video Win. 419.95

Hercules

15789 Dynamite Pro 2MB 219.95

15791 Dynamite Pro VLB 2MB 219.95

15792 Graphite Pro VLB 2MB 269.95

Intel ... 3 years

11587 Smart Video Recorder 499.95

KOSS Speakers w/AC ... lifetime

11323 HD-4 54.95 11700 HD-6 79.95

Close-Up

Marked Attention

NORTON-LAMBERT

2754 *Close-Up 5.0 Host & Remote*—Take control of PCs miles away by modem & run both Windows & DOS applications.

For remote access to PCs & networks, file transfer, remote support & general communications.

\$119.95

Texas Instruments

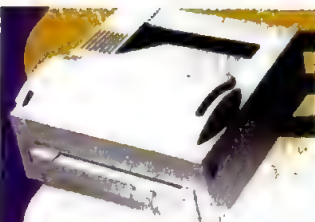
8934 *TravelMate 4000F WinSX/25C Mono*—486SX 25 MHz, 4MB (on-chip) RAM, 8K cache, 10" passive-matrix monochrome VGA with 64 gray scales (resizable), 120MB drive, full-travel keyboard, TravelPoint pointing device.

\$1729.

TEXAS INSTRUMENTS

6441 *TravelMate 4000F WinDX/25C Active Matrix Color Notebook*—6.3 pounds, 200MB, 16ms IDE Hard Drive, 8.4" Active Matrix Color Display, 4MB RAM (upgradable to 20MB), 1.44MB Floppy, Trackball.

\$3799.



Hewlett-Packard

12312 HP LaserJet 4L (with toner)—Affordable performance! Four pages per minute, 800 dpi, RISC-based Resolution Enhancement Technology, 1MB memory, microfine toner, 100-sheet paper tray.

\$699.95



\$25 MFG REBATE OFFER EXPIRES 5/31/94.

EPSON AMERICA

11495 Stylus 800 Ink Jet Printer—The laser look, without the laser price. Advanced piezo technology delivers crisp 360dpi output. Whisper-quiet operation, compact footprint, 100-sheet paper tray.

\$289.95



TOSHIBA

14846 T1950CT/200 Active Matrix Color Notebook—40MHz i486DX2, 8K cache, coprocessor, 4MB RAM, 8.4" Active Matrix SuperVGA, 256 colors at 640x480, 200MB Drive.

\$3069.



Toshiba

14350 T4eDC Monochrome Notebook—33MHz SL Enhanced 486 (3.3 volts) with 8K cache, integrated coprocessor, 4MB RAM (expandable to 22MB), 9.5" monochrome STN display, 200MB Drive, 6.4 pounds. Only while supplies last!

Order Early!

\$2199.

Logitech ... 2 years	
14040 SoundMan Super Pak	\$139.95
Media Vision ... 3 years	
12028 ProAudio Studio 16	219.95
NEC MultiSync Monitors ... 2 years	
11949 3FGE	629.95 14317 3V
11948 4FGE Monitor	749.95
Number Nine	
1871 #9GXE (1MB) ISA 3230 VLB	249.95
Sony ... 1 year	
6801 CDU-7811 Dbl. Speed CD-ROM	459.95
14112 GDM-17se1 17"	1279.

INPUT/OUTPUT

Caero ... 1 year	
4277 OmniScan (w/OmniPage Direct)	289.95
Canon ... 1 year	
15893 IX4015 Scanner	999.95
Canon BubbleJet Printers ... 1 year	
15187 BJ200E 299.95 9614 BJ-600 Color	599.95
CoStar ... 1 year	
1814 LabelWriter II Plus	239.95
Epson ... 2 years	
11800 LQ570+ (80 col., 269 cps)	269.95
12554 Action Laser 1500 (2MB)	769.95
13110 Action Scanning System	799.95
11495 Stylus 800	289.95
Hewlett-Packard ... 1 year	
6442 LaserJet 4 (with toner)	1479.95
13682 4P 1059.95 12212 LaserJet 4L	699.95
14688 ScanJet 2CX	999.95
IBM Keyboards	
13488 Basic (570) 57.95 13485 Pro (571)	89.95
IBM Tape Drives ... 2 years	
13194 TD630-250MB tape backup (int.)	159.95
Kensington Mouse ... 1 year	
7899 Expert 4.0 (ser.) 99.95 7900 (bus)	114.95
Kraft ... 5 years	
8346 Thunderstick with JetFighter 2	39.95
Logitech ... limited lifetime	
3996 Trackman2 (combo)	89.95
3295 Mouseman (combo)	45.95
9766 Mouseman (cordless)	89.95
2468 ScanMan256 w/OmniPage Dir.	199.95
7463 ScanMan Easy Touch for Win.	229.95
13934 Cyberman 3D Controller	79.95
Microsoft Mouse ... lifetime	
7597 Senal Mouse 69.95 2898 w/Win	144.95
1896 Ballpoint Mouse	79.95
MicroSpeed ... 1 year	
6007 PC-TRAC Trackball	59.95
Microtek ... 1 year	
13362 Scan-In-Dex 279.95 13361 Scooter	419.95
5187 ScanMaker II 639.95 13360 IIS	749.95
13359 ScanMaker IIs 489.95 5175 IIs	989.95
Mouse Systems ... lifetime	
7878 PC Mouse III (serial)	69.95
NEC	
14304 Silentwriter 1097	1459.
OkiData ... 1 year	
6174 OkiData OL400E Laser Printer	549.95
15076 OkiData OL410E	699.95

Pacific Data	
13040 ProTracer II	\$1399.95
Seiko ... 1 year	
1506 Smart Label Printer Pro	249.95
Texas Instruments microLaser Series	
13658 Pro 600 PS23 1399. 13659 PS85	1599.
UMAX ... 1 year	
13514 ScanOffice for Windows	799.95

ACCESSORIES/DISKS

American Power ... 2 years	
3819 Back-UPS 250 115.95 3858 400	179.95
7107 Back-UPS 450	215.95
Curtis ... lifetime	
7654 Command Center Plus	78.95
Cyrix	
10538 486 DRX2 25/50 Micro. Upgrade	339.95
14035 486 SRX2 20/40 Micro. Upgrade	239.95
Fuji Disks ... lifetime	
2215 3.5" HD (10) 11.95 2241 (50)	44.95
5692 3.5" HD Preformatted (20)	22.95
Intel ... lifetime	
4750 80387SX 79.95 5409 80387DX	85.95
6418 486 DX2 OverDrive Proc. 486SX-25	369.95
Kensington Full line avail. ... 1 year	
2582 MasterPiece Plus	94.95
7060 MicroSaver Security System	39.95
PC Power & Cooling ... 2 years	
9537 CPU Cooler (386/33 up to 486)	21.95
7915 Turbo Cool 300	159.
14748 110 Alert	19.95
Sony Disks/Cartridges	
6375 3.5" HD (30) 32.95 11871 (100)	89.95
1603 DG60M	11.95 2520 DG60M
14.95	
Targus ... lifetime	
7369 Notepac 35.95 1305 Universal	69.95
Tripp Lite ... 2 years	
6199 Isobar 4-6 43.95 6200 Isobar 6-6	49.95
5550 BC250 Battery Backup	119.95

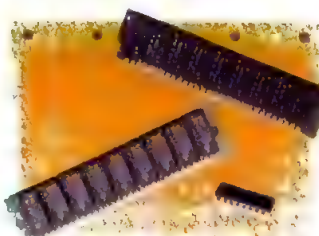
DRIVES

Colorado Memory Systems ... 1 year	
4354 Jumbo 250 Tape Backup	179.95
1073 Trakker 250 Tape Bckp. (parall.)	349.95
Conner Peripherals ... 1 year	
1337 CP30254 250MB IDE HD (16ms)	289.95
13503 CP30540 540MB SCSI Drive	699.95
Omega ... 1 year	
13803 Bernoulli Insider 150 IDE	489.95
10602 Bernoulli 150MB Cartridge	99.95
10452 Transportable MultiDisk 150	559.95
10537 PC Powered 150 PRO	479.95
2530 90MB Cart. 99.95 2467 Tripak	289.95
MDS Removable Hard Drives	
11851 MDS 105MB 3.5" Int. Removl IDE	429.95
NEC CD-ROM Drives ... 2 years	
13339 CDR-400 MultiSpin 3Xp	449.95
13341 CDR-500 MultiSpin 3Xi	499.95
13340 CDR-600 MultiSpin 3Xe	599.95
TEAC AT Drives ... 1 year	
6951 1.2MB	55.95 7371 1.44MB
45.95	



614 BJC-600 Bubble Jet Color Printer—Produces sharp, vivid 360 dpi color output on plain paper. Advanced 64-nozzle printheads virtually eliminate bleeding. Prints 240 cps at 10 cpi in draft mode; 340 cps at 20 cpi in high-quality mode.

\$599.95



MEMORY UPGRADES

Bring out the power of Windows, etc. by boosting your memory. Memory prices may vary. Please call for latest pricing.

5746 1MB Chips (80ns, set of 9)

\$49.95

5510 1MB x 9 SDRAMs (80ns) 59.95
2497 4MB x 9 SDRAMs (80ns) 189.95



MDS CD-ROM Drives

14405 MDS Chinnon 535—This double-speed CD-ROM drive is ideal for large graphic files. Delivers smoother Video Playback. Multisession PhotoCD compatible.

\$429.95

14309 Future Domain SCSI Adapter 99.95



Canon

15918 LBP-960 Laser Beam Printer—Exceptional print quality and speed. Delivers crisp 600 dpi output at up to 8 pages per minute. RISC processor, 2MB memory, Super Fine Toner, 250-sheet paper cassette.

\$1389.95

OUR POLICY

- We accept VISA, MASTERCARD, and American Express.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order (in the U.S.).
- No sales tax, except Ohio residents (please add applicable tax).
- All U.S. shipments insured; no additional charge.
- APO/FPO orders shipped First Class Mail.
- International orders: U.S. 100 minimum, add 2% surcharge and \$2.30 insurance. Manufacturer support and upgrade eligibility may be limited outside the U.S.A. Some products not available for export, call or fax information.
- Upon receipt and approval, personal and company checks clear the same day for immediate shipment of your order.
- Corporate P.O.s accepted subject to approval.
- COD maximum \$1000. Cash or certified check. COD orders require an additional \$4.50 charge. COD orders ship via UPS and may require additional UPS charges.
- 120 day limited warranty on all products. Defective software replaced immediately. Defective hardware repaired or replaced at our discretion. All items subject to availability. Prices and promotions subject to change without notice.
- We are not responsible for typographical errors.
- Order lines opened continuously from 8 a.m. Monday until 5 p.m. Sunday ET. Business offices at 603-446-3363 Monday through Friday 9 a.m. to 5:30 p.m. ET.

SHIPPING

Continental U.S.: The total freight charge on any order placed with PC Connection is only \$5. Barring events beyond our control, all credit card orders (no COD orders) phoned in weekdays by 3 a.m. ET will ship Airborne Express for delivery the next business day. Which means same day delivery for orders placed between midnight and 3 a.m. ET. (Some orders may ship by UPS Ground for next day delivery). Saturday delivery available to many areas upon request at no additional charge. Order all day Saturday through noon on Sunday for Monday delivery. (Some areas require an additional day delivery).

Hawaii, Alaska, Canada, Puerto Rico and the U.S. Virgin Islands: Shipping to these areas may require additional time and charges. Call 800-800-0004 for information.

All other areas: Please call 603-446-0004 or FAX 603-446-7791 for information.

PC Connection®

800-800-0004

594PCM



6 Mill Street, Marlow, NH 03456

SALES 603-446-0004 FAX 603-446-7791

© COPYRIGHT PC CONNECTION, INC. 1994. PC CONNECTION, PCV and the MDCONN CHARACTERS ARE REGISTERED TRADEMARKS OF PC CONNECTION, INC. MARLOW, NH. ALL OTHER TRADEMARKS REMAIN THE PROPERTY OF THEIR RESPECTIVE COMPANIES.

230 Megabyte Floppy?

3.5" Magneto Optical Drive

230 Megabyte

3600 RPM



It's the same size as a 3.5" floppy diskette. It's as fast as most hard disk drives. And you can write, erase and rewrite over four million times.

But it's no floppy! It's Pinnacle's new Tahoe™ 230 Portable 3.5" Optical Hard Drive with 230 Megabytes of removable optical storage.

The Tahoe™ 230 is the most versatile storage device available today.



Optical Drive
\$1199.00

Travel Case
& Battery Pack
\$199.00

Optical Media
\$69.00



It's a perfect
solution for both
portable and
desktop
computing.



PARALLEL PORT

You can store it all as your main storage device, your secondary storage drive, or for backup and archival.



SCSI PORT

The Pinnacle Tahoe™ 230 is the ultimate in unlimited storage. For more information or to order call:

800.553.7070

PINNACLE MICRO
THE OPTICAL STORAGE COMPANY®

19 TECHNOLOGY • IRVINE, CA 92718, USA • (800) 553-7070 • INT'L (714) 727-3300 • FAX (714) 727-1913

Trademarks: Tahoe 230 of Pinnacle Micro, Inc. All trademarks and registered marks to their respective owners.

CIRCLE 866 ON READER SERVICE CARD

commands, provided you know all the numbers that may appear in your 7-by-*n* data range.

For example, suppose that the values you want to analyze occupy the range A1..G200, that the remainder of the worksheet to the right of column G is blank, and that the cells in A1..G200 may contain any integer between 1 and 100, inclusive. You could find the six most frequently occurring values as follows:

At cell I1, use /Data Fill to create a column of consecutive integers that begin at 1 and end at 100. Specify I1..I100 as the fill range, 1 as the starting value, 1 as the step value, and 8191 (the default) as the stop value.

Next, move to J1 and issue the /Data Distribution command. Specify A1..G100 as the values range and I1..I100 as the bin range. In a moment, a new set of numbers will appear in column J indicating the frequency with which each value in column I appears in range A1..G100. A 0 will appear in cell J101, indicating that there are no values greater than 100 in the range A1..G100.

Finally, issue the /Data Sort command. Specify I1..J100 as your data range, specify J1 as your primary sort key, type D to indicate that you want a descending sort, and press G for Go. After the two columns have been sorted, the values in I1..I6 will be the six most frequently occurring values in A1..G100.

—Craig Stinson

Databases

USING FOXPRO'S TEXTMERGE TO GENERATE SOURCE CODE

► **PC MAGAZINE:** FoxPro's versatile text-merge capability lets you combine literal text with the contents of database fields, memory variables, array elements, and the results of functions, expressions, and calculations. Not only can you use text merge to generate form letters that take names and addresses from the contents of database fields, but you can even use it to generate source-code programs for use in your applications.

In the February 22, 1994, installment



Figure 1: The RECDX program generates source code to re-create a .CDX file, duplicating the tag names and index expressions that already exist in the .CDX.

of Solutions, I discussed how text merge works and reviewed the TEXTMERGE commands. I also mentioned FoxPro's GENSCRN and GENMENU programs, which use the text-merge feature extensively to generate custom source code for your screen and menu designs.

Another task well suited to text merge is the generation of source code for those routines you ordinarily include in every application. For example, most applications include code to re-create all of the index tags in any compound-index files used. That way, if an index file becomes

corrupted, the user can easily re-create it from scratch.

Repeatedly coding such a routine for every index file is tedious and error-prone. What's needed is a program that gets the index-tag information from a .CDX file and then generates the source code to re-create that file from the existing tag names and expressions.

Figure 1 shows one version of such a program, called RECDX.PRG. To use it, first select the FoxPro Command window, and then use the DO command to call the RECDX program, passing it three para-

MEMORY!

H.Co. has America's largest selection of memory products, and we'll beat any USA advertised price!

PCMCIA PRODUCTS

BRAND NEW DEALS!

SRAM	
1MB SRAM Card	\$135.00
2MB SRAM Card	265.00
512K for Apple Newton	125.00
1MB for Apple Newton	165.00
2MB for Apple Newton	265.00

FLASH	
2MB Flash Card	\$265.00
4MB Flash Card	485.00
8MB Flash Card	649.00
16MB Flash Card	1195.00

HARD DRIVES	
165MB Type III	\$565.00

FAX MODEMS	
9600/4800	\$155.00
14.4/14.4	265.00

PERIPHERALS	
SCSI II PCMCIA Adaptor	\$219.00
10-Base T Network Adaptor	179.00
Internal Desktop PCMCIA Card Reader	285.00



Laptop Memory

TOSHIBA	
T2000SX, SXE T1800, T1850	
4MB	\$169.00
8MB	319.00
T3100SX, T3200SX/SK	
2MB	89.00
4MB	149.00
T3200	149.00
T5100	89.00
T5200, C, T8500	89.00
8MB	299.00
T3100	189.00
T4400 T6400, T3300	139.00
4MB	189.00
T4400, T6400	389.00
4MB	209.00
T4500	419.00
8MB	999.00
16MB	1099.00

IBM	
L40SX, N51	4MB 149.00
	8MB 295.00
CL57SX, Thinkpad	4MB 349.00
	8MB 659.00
PS Note	2MB CALL
	4MB CALL
	8MB CALL
PS Note 486	4MB CALL
	8MB CALL
	16MB CALL

COMPAQ	
Contura 3/20 25	4MB 197.00
	8MB 419.00
Contura 425	8MB 199.00
	8MB 429.00
LTE Lite/20, 25, 25c	4MB 229.00
	8MB 395.00
LTE Lite 4/25c	4MB 249.00
	8MB 399.00

NEC	
UltraLite III, SL/25c	2MB \$149.00
	4MB 249.00
UltraLite SL/20 SL/20P	4MB 207.00
	6MB 297.00
Prospeed 386	2MB 147.00
	8MB 449.00

CANON	
NoteJet 486	2MB \$159.00
	4MB 259.00
	8MB 459.00

ZENITH	
Z-Note	2MB \$169.00
	8MB 489.00
Z-Sport	2MB 129.00
MastersPort SL/SLC SLE	2MB 109.00
MastersPort 386SX	2MB 119.00
SlimsPort	2MB 139.00
	4MB 279.00

OTHERS	
TI TravelMate 2000	1MB \$89.00
TI TravelMate 3000	2MB 95.00
TI TravelMate 4000	4MB 219.00
AST PremExec	4MB 135.00
AST PowerExec SL EL	4MB 179.00
Apple Powerbook (All Call for current prices)	

Desktop Memory Upgrades

AST	
Bravo 486/25	2MB KIT \$110.00
	8MB KIT 287.00
Bravo 4/66d, 50d, 33 33s 25s	
	4MB MD 145.00
	8MB KIT 289.00
	16MB MD 619.00
Prem 386/SX 16, 20, 25, 33	
	8MB KIT 289.00
Prem II SX/33, 25, 20, 16	
	1MB KIT 55.00
	4MB KIT 149.00
	8MB MD 219.00
Cupid Exp	
Prem 386c Wkst&Bravo 286	4MB KIT 179.00

NEC	
PM SX/SX PLUS	2MB BD \$219.00
	4MB BD 279.00
	8MB BD 519.00
PM SX/20	2MB CPU UPG 169.00
	2MB UPG EXP 209.00
	2MB UPG KIT 89.00
PM SX/16	2 SMR BD 189.00
	2MB UPG KIT 85.00
PM 386/20, 25	2MB MD 299.00
	8MB MD 699.00
PM 386/25	8MB REP BD 999.00
PM 386/25S	2MB KIT 159.00
	8MB KIT 499.00
PM 386/33E 486/25E	
	2MB MD 199.00

COMPAQ	
DP 386 33 486/25 33 System Pro	
	2MB MD \$97.00
	8MB MD 289.00
DP 386/20e 20.25e 25 386s/16	
	4MB BD 269.00
	4MB MD 169.00
DP 386N 386SX/20 ProSignia	
	2MB BD 79.00
	4MB MD 159.00
ProSignia	8MB MD 309.00
ProLinea 4/25s 33 50	
	8MB MD 309.00

IBM	
50Z, 55SX, LS, 65SX, LS 70-E61, 70-121 P, 70	
	1MB MD \$50.00
	2MB MD 80.00
55SX, LS, 65SX, LS	4MB MD 149.00
70-A21, 70-A61, 70-B21, 70-B61	
	2MB MD 80.00
30/286	2MB KIT 80.00
PS/1 286 386SX	2MB UPG 90.00
80-041	1MB BD 79.00
80-111 31	2MB BD 99.00
80-A21, A31, A61	4MB BD 149.00
57.57SX, 90 95, P1 Pro	
	4MB MD 149.00
	8MB MD 289.00
70.80	4-14MB BD 279.00
50 & 60 SERIES	4-14MB BD 259.00

SIMM MODULES

1X9-80	\$46.00	2X8-80	\$88.00
1X9-70	47.00	4X8-70	139.00
1X9-60	54.00	16X8-70	565.00
1X9(3)-70	39.00	512X36-80	90.00
4X9-70	142.00	1X36-80	149.00
1X8-80	47.00	2X36-70	319.00
1X8-70	48.00	4X36-70	649.00

H.Co. Computer Products is licensed to manufacture modules from the inventor of standard PC technology simms!

H.Co. Supports Fully Compatible Memory For These Leading Systems:

ALL • Apple • AST • AT&T • Canon
Compaq • Data General • DEC • Dell
Epson • Hewlett-Packard • HP • IBM • Intel • NEC
Olivetti • Packard Bell • Panasonic • Sanyo
Siemens • Sharp • TI • Toshiba • Zenith
and more...

H.Co. is now open weekends!

Math Coprocessors And CPU Upgrades

INTEL Overdrive		CYRIX Overdrive	
486-33 (66 Mhz)	\$545.00	386-33 to 486-33	\$115.00
486-25 (50 Mhz)	415.00	386-40 to 486-40	145.00
486-16/20 (40 Mhz)	315.00	386x20 to 486-40	275.00
		386-16 to 486-32	285.00
		386-20 to 486-40	335.00
		386-25 to 486-50	375.00
		386-33 to 486-66	425.00

INTEL	
80387DX	\$89.00
80387SX	87.00
80387SL	87.00
80287XL/XT	72.00

III	
80387-40	\$82.00
80387-33/25	69.00
80387SX 33	75.00
80387SX 25/20	64.00

Assorted 386-33 to 486-66

Cyrix

Kingston processor upgrades also available

Laser Printer Memory

HP Laserjet II, III, IV, IVi	2MB BD \$99.00
	4MB BD 175.00
HP Laserjet 4L	1MB MD 68.00
HP Laserjet 4 4M 4P, IIIi	2MB MD 95.00
	4MB MD 162.00
	8MB MD 299.00
HP Deskjet 500, 500C, 550C	256K MD 59.00
IBM 4019, 4019e	2MB MD 119.00
	3 5MB MD 189.00
IBM 4029, 4039, 4079	2MB BD 89.00
	4MB BD 169.00
OKI Laser 400	2MB MD 99.00
OKI Laser 800, 820	2MB MD 129.00
	4MB MD 199.00

Panasonic 4420, 4450, 4410, 4430	
	2MB MD 119.00
	4MB MD 189.00
Panasonic 4455	2MB MD 159.00
Epson EPL6000	4MB MD 189.00
Epson EPL 7500	2MB MD 145.00
	4MB MD 225.00
Epson Action Laser II	2MB MD 149.00
	4MB MD 229.00
Canon LBP-III, IIIPlus	2MB BD 239.00
	3MB BD 195.00
Canon LBP-4	2MB BD 145.00
Canon LBP-4SX	4MB MD 219.00
TI MicroLaser XL	1MB MD 49.00
	4MB MD 229.00

German Office: H.Co. Computer Products, Inc.
Deisterstrasse 11 • 30449 Hannover, Germany
Tel: 0511-458-2411 Fax: 0511-458-2440

All H.Co. Manufactured Memory Products Carry A Lifetime Warranty!

Call H.Co.'s Memory Experts Toll Free
1-800-RAM-CHPS or 1-800-726-2477



H.Co. Computer Products, Inc.
16812 Hale Avenue
Irvine, California 92714
Office: 714-833-3222
Tech Support: 714-833-3364

PO's Accepted From Universities, Government Agencies, and Qualified Firms.

TERMS:

- 1 VISA MC AMEX Discover C.O.D. Pre paid and Approved PO's only
- 2 FAX orders and International orders accepted
- 3 15% Restocking fee on returns within 30 days. No refunds after 30 days
- 4 All returns require an RMA number, sorry no software returns
- 5 All credit card purchases are verified for your protection

H.Co. will beat or match prices from companies with new merchandise inventory available. Offer excludes ship and SIMMs. Minimum order \$100.00. Dues: This sample price is for informational purposes only. Terms of purchase are subject to change without notice. H.Co. same day shipping guarantee applies only to products in stock. trademarks are the property of their respective owners. All prices subject to change without notice.

COMPUTER RESOURCES CIRCLE 10 ON READER SERVICE CARD

INTELLIGENCE RECOGNIZED!

"ZyXEL modems are now among the best performers" - PC Magazine

Leading publications are continuing to recognize, rave about and award the many smart performance features that make ZyXEL the industry leader. And why shouldn't they? Our Ultra High Speed Modems fit a wide range of configurations, giving you more Intelligent Features that save you time and money.



"ZyXEL modems are loaded with features, they comprise a virtual treasure box of surprises." -

Boardwatch Magazine

The ZyXEL U-Series offers Intelligent Features to ensure speed, reliability and true "plug-and-play" operating ease. Our new VoiceFax Software* and two-way fax ability lets you send and receive voice mail from remote locations. Our Rackmount and NMS give you simultaneous control of hundreds of sites. And, if you're on the go, our New U-1496P Portable Modem/Fax offers cellular capability and portability.

"Some modems are good. Some modems are fast. ZyXEL modems are good and fast."



- Computer Shopper

The ZyXEL PLUS Series gives you up to 19.2 Kbps, with DTE speeds of up to 76.8 Kbps in modems that come with a 5-year warranty** and will soon be upgradable to V.Fast Advantage.***



ZyXEL's Intelligent Features

- Ultra High Speed 19.2/16.8 Kbps
- V.32bis/V.32, V.22bis/V.22, BELL 212A
- V.17-14.4 Kbps, EIA Class 2, G3 Fax, S&R
- V.42/V.42bis with Selective Reject
- MNP® 3/4/5
- Digitized Voice Capability
- Caller ID/Distinctive Ring
- Remote Configuration
- Auto Fall Forward/Fall Back
- Call-Back Security with Password Protection
- Line Probing Techniques
- 24 Wire Leased/Dial Line
- Auto Data/FAX/Voice Detection****
- Upgradable by EPROM

To find out more about the

ZyXEL U-1496P
PORTABLE WITH CELLULAR
call your ZyXEL
sales representative today!

ZyXEL
The Intelligent Modem

CIRCLE 927 ON READER SERVICE CARD



"ZyXEL modems scored a three-way tie for best two-way communications modem."

- BYTE



Out of the 62 modems tested, ZyXEL was honored by PC Magazine as one of only three modems proving 100% reliable connections.

Also, ZyXEL modems are compatible with most other modems and operate in both synchronous and asynchronous modes as well as in all environments: DOS,™ Windows,® OS/2,® Macintosh,® UNIX,® NeXT® and Amiga.™ And, with V.25bis for synchronous communications, ZyXEL is compatible with IBM's AS/400® and RS/6000.®

ZyXEL recognizes Intelligent Resellers.

Join ZyXEL's Authorized Reseller Program, and you can benefit from our award winning modems.

Our program offers you:

- Higher profit margins
- Vigorously tested and evaluated products
- Pre and post sales and technical support
- Fortune 500 quality products
- Co-operative marketing funds
- Demo unit discounts
- Extensive trade show support
- Lead referrals

Find out what the Industry Experts already know. Call ZyXEL. A Wise Investment.

An Intelligent Modem.

(800) 255-4101



June 29, 1993
ZyXEL U-1496 PLUS



February 1993
ZyXEL U-1496E PLUS



July 7, 1993 "The ZyXEL U-1496E PLUS costs less than many of the reliable modems that it outperforms."



ZyXEL U-1496E PLUS



ZyXEL U-1496E



July 1993, ZyXEL U-1496E PLUS
ZyXEL U-1496 PLUS
Top 10 List



June 1993
ZyXEL U-1496E



July 10, 1993 "The ZyXEL modem is...logically across the board."



ZyXEL U-1496 PLUS



November 1992
ZyXEL U-1496
ZyXEL U-1496E



Winter 1992 ZyXEL U-1496
Awarded 5 NextWORLD Cubes

4920 E. La Palma Avenue, Anaheim, CA 92807 (714) 693-0808 BBS: (714) 693-0762 FAX: (714) 693-8811

*Available with Windows,™ DOS,™ and Macintosh® versions. **2-year warranty for Rackmount models. ***V.Fast upgrade price depends upon the model. This offer is valid in USA and Canada only. ****Auto Data/Fax/Voice detection available on DOS version. Window/Mac version available with Auto Fax/Voice detection. Prices and specifications are subject to change without prior notice. All trademarks and logos are the property of their respective owners.

EPS... KING OF THE JUNGLE.



EPS GREEN WORKSTATION

- Intel Pentium Technology Ready
- 4MB Expandable To 64MB
- 256K Cache Standard
- 1.44MB Floppy Disk Drive
- High-Speed IDE Local Bus Adapter
- 245MB IDE Hard Drive
- 1MB RAM, VLB Video 16.8 Million Colors with Accelerated Windows Drivers, (expandable to 2MB)
- 14" 1024 x 768 Non-Interlaced SVGA Color Monitor, .28 Dot Pitch
- 101 Enhanced Keyboard
- Desktop Case with Six Drive Bays
- MS DOS 6.2, MS Windows for Workgroups 3.11 with Documentation (Pre-Installed)
- MS-Compatible Mouse with Pad
- System User Manuals
- 60-Day Money-Back Guarantee
- 3-Year Superior Warranty
- 1-Year On-Site Service
- Customizing Available
- Energy Star Compliant

EPS 486-SX33

\$1375

EPS 486-DX250

\$1569

EPS 486-DX33

\$1545

EPS 486-DX266

\$1625

Power

EPS GREEN WORKSTATION

- Intel Pentium Technology Ready
- 16MB Expandable To 64MB
- 256K Cache Standard
- 1.44MB Floppy Disk Drive
- High-Speed IDE Local Bus adapter
- 345MB IDE Hard Drive
- 1MB RAM, VLB Video 16.8 Million Colors with Accelerated Windows Drivers, (Exp. to 2MB)
- 15" 1280 x 1024 Digital Color Monitor MPR II Low Radiation, .28 Dot Pitch
- 101 Enhanced Keyboard
- Desktop Case with Six Drive Bays
- MS DOS 6.2, MS Windows for Workgroups 3.11 with Documentation (Pre-Installed)
- MS-Compatible Mouse with Pad
- System User Manuals
- 60-Day Money-Back Guarantee
- 3-Year Superior Warranty
- 1-Year On-Site Service
- Customizing Available
- Energy Star Compliant

EPS 486-DX250

\$2045

EPS DX4-100

\$2345

EPS 486-DX266

\$2145

EPS PENTIUM 60

\$2995

EPS Technologies

**ORDER TOLL FREE TODAY
1-800-447-0921**

GSA Contract #GS00K91AGS5035-PS02

Small Business ESC Entry TS, Part 1, Section B/E

EPS Technologies, Inc. • 100 69 Dakota Avenue • P.O. Box 278 • Jefferson, SD 57038

Call Center 605-966-5482 • Direct Line 605-966-5586 • Technical Hotline 800-526-4250

Hours: 7 am-7 pm M-F, 9 am-3 pm Sat CST

All brands and product names mentioned are trademarks or registered trademarks of their respective holders.

Prices are subject to change without notice. INTEL is a trademark of INTEL Corporation.

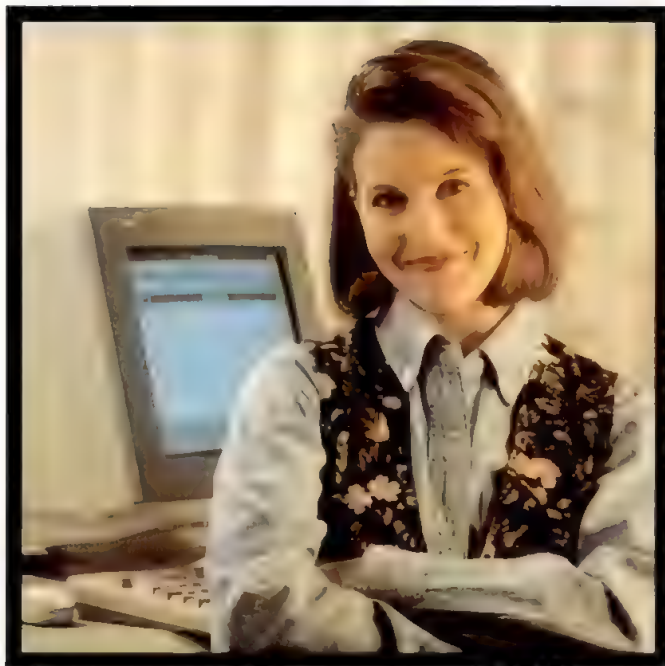
CIRCLE 197 ON READER SERVICE CARD



Remember how simple life used to be?

Pentium Special
\$2,495!

It still is at AT&T.



When you were young, your world was your own. And nobody was more important than your best friend.

Today, your world's a little larger. But, admit it, with the complexities of everyday life, don't you yearn for the simple, honest, direct friendships you had as a kid?

We make buying a computer what it should be: easy... simple... direct.

At AT&T, we want your relationship with us (and your computer) to be uncomplicated and rewarding. Our only goal is to delight you with the ease and simplicity of owning and using one of our computers. The best way to do that, of course, is to give you the very best technology supported by a team of friendly, knowledgeable people.

One call starts it all.

It begins with the skilled associate at the other end of our 800 number... someone who helps you select the system that's right for you. Choose from the latest, proven technology designed to run your applications to the fullest.

It's the little things that count.

We don't expect you to know all the details that separate an ordinary PC from the quality we build into ours. That's our job. But here are a few you might appreciate: performance-matched components for an extra measure of durability; parity RAM for internal error checking; write-back cache for faster applications; ZIF sockets for easy upgrading; and an open system architecture that lets you plan for the future.

Questions? A Techline associate wants to talk to you.

When your computer arrives, it'll be up and running in a few short steps. If you have any questions, no matter how simple or complex, just pick up the phone and talk with one of our Techline associates. They can lend you a helping hand anytime day or night.

Easy business leasing and personal financing. Even a 30-day guarantee.

Ordering from AT&T is easy, too. Use a major credit card. For personal purchases, extend your credit with an AT&T Direct Connect credit card. And businesses can consider a lease through AT&T Capital Corporation. Don't forget, you have 30 days to try out your new system. If for any reason you find it's not right, we'll get another for you, or refund your money. It's that simple.

A friend in need...

Once you're up and running, we stick by you with an industry-leading service and support program. It's highlighted on most systems by our free, three-year warranty that includes parts, labor and monitor.

...is a friend in deed.

If you need on-site service, we're just an 800 number away. We'll send one of our 5,000 AT&T Service Technicians to your business or home the next business day. They'll show up with the skills, parts and dedication to get your PC back on its feet in no time. (With over 700 locations in the U.S., we're always close at hand.)

Call AT&T Direct Connect.



A computer built and backed by people committed to helping you get, move and use information easily. That's the kind of relationship you'll have with AT&T. Promise. All you have to do is call AT&T Direct Connect, or a reseller near you. It's that simple. After all, what are friends for?

We make Pentium easy.



**System 3260
Pentium Power!**

\$2,495 or \$91/month

- Intel Pentium 60MHz
- PCI Local Bus
- 2 PCI Expansion Slots / 3 ISA Slots
- 4 Drive Bays
- 340MB Hard Drive
- 8MB RAM
- 256KB External Cache
- 3.5" Floppy Disk Drive
- 1MB Video RAM
- 14" SVGA VESA Flicker-Free .28mm Monitor
- MS DOS 6.0, MS Windows 3.1
- Mouse & Keyboard
- 1 Year On-Site Warranty



AT&T
Global Information
Solutions



Call AT&T Direct Connect: 1-800-865-8595

AT&T Global Information Solutions products are available through Direct Connect; or call 1-800-624-7187 for the reseller nearest you.

Simple Solutions - Samples Of Our Fully Configurable Systems!



System 3230

Complete On-Line Solution!

\$1,495 or \$55/month

*Complete on-line computing power!
Includes super fast modem and six
on-line software packages!*

- Intel Pentium OverDrive Ready
- Intel486SX/33
- 170MB Hard Drive
- 4MB RAM
- 14,400 Data/14,400 Fax Modem
- Preloaded On-Line Software Pkgs
- Preloaded Microsoft Works
- 14" SVGA 28mm Monitor



System 3230

Complete Turnkey Solution!

\$2,195 or \$80/month

*All you need to be up and running in a
snap - PC, Monitor, Printer, Modem,
and Software!*

- Intel Pentium OverDrive Ready
- Intel486SX/33
- 270MB Hard Drive
- 8MB RAM
- 2,400 Data/9,600 Fax Modem
- Preloaded On-Line Software Pkgs.
- Preloaded Microsoft Works
- 300 dpi Ink Jet Printer
- 14" SVGA 28mm Monitor



System 3333

Fantastic Powerhouse!

\$3,405 or \$124/month

*Ultimate upgradability, with 6 slots,
5 bays, and optional 2GB HDD,
2MB VRAM, 64MB RAM, and more!*

- Intel Pentium OverDrive Ready
- Intel486DX2/66
- 2 VESA Expansion Slots/3 ISA Slots
- 520MB Hard Drive
- 16MB RAM
- 256KB Cache
- 14" SVGA 39mm Monitor



Safari 3150

Road Ready!

\$2,995 or \$84/month

*Complete package for the road
warrior. 100% performance
at the office or on the road!*

- Intel486SX/25
- 170MB Hard Drive
- 4MB RAM
- 9.5" Active Matrix Color Screen
- Floppy, Trackball, and PCMCIA Slot
- Pre-loaded DOS, Windows, Bitfax, Tourguide,
AT&T Mail, and more!



Safari 3180

Great Desktop Replacement!

\$3,795 or \$139/month

*Mobile performance that is fully
loaded for people on the go!*

- Intel486SL/33
- 180MB Hard Drive
- 4MB RAM
- 9.5" Active Matrix Color Screen
- Floppy, Trackball, and 2 PCMCIA Slots
- Pre-loaded DOS, Windows, Bitfax, Tourguide,
AT&T Mail, and more!

Get it. Move it. Use it. Only with AT&T.

Next business-day service and 24-hour technical support.
Free 3-year warranty - parts and labor included - even on the monitor!



We accept VISA, MasterCard or American Express credit cards. Ask about our business financing through AT&T Capital Corporation and personal financing options. **Hours: 8-8, M-F; 10-6, Sat.**

Call AT&T Direct Connect:

1-800-865-8595



AT&T
Global Information
Solutions

AT&T and the AT&T globe design are registered service marks and trademarks of American Telephone and Telegraph Company. The Intel Inside logo, Intel486 and Pentium are trademarks of the Intel Corporation. DOS and Windows are trademarks of Microsoft Corporation. All other trademarks acknowledged. Prices, configuration and availability subject to change without notice. Prices and money-back guarantee do not include shipping. Shipping charges are calculated according to weight and distance. Appropriate sales tax will be added. AT&T Global Information Solutions is not responsible for errors in typography or photography. Product offering and prices may vary by dealer/reseller. Financing options may vary by country. © 1994 AT&T Global Information Solutions Corporation.

TO THE WORKS!

Best Quality Service & Lowest Pricing

FREE

UPGRADE
to AIR
FREIGHT

MULTIMEDIA

PRINTERS

SOFTWARE

MULTIMEDIA



MediaVision Fusion Double LX int.
Comes with 10-MHz Sound Card, CD-ROM
Drive, Speakers and more!
\$299

MediaVision MV-2000 Family Deluxe 319
MediaVision MV-4000 Reno Premier ext. 465
MediaVision Fusion Double CD16 int. 395
MediaVision Pro16 Multimedia II 499
MediaVision Pro16 Multimedia III 709
MediaVision Memphis ext. CD-ROM Kit 579
Sony CDU33 AV Starter Kit int. 269
Sony CDU33 AV Multimedia Kit int. 449
Sony CDU700-3A Multimedia Kit ext. 539
Plextor 3028-1650 Bundle int. 499
Plextor 3028-MVPAS16 Bundle int. 499
Plextor 3028-1650 Bundle ext. 599
Turtle Beach Multisound upgrade 1248

VIDEO CAPTURE

Creative Labs Video Blaster SE 229
Creative Labs Video Spigot 249
Creative Labs Video Blaster FS 2000 349
Hauppauge WinTV-01 no tuner 319
Hauppauge WinTV-02V no tuner 419
MediaVision ProMovie Studio 179
TrueVision Video VGA6 / VGA16 679/799
TrueVision Target+ 16 / 64 1195/1699
Willow VGA TV 4000 529
Sigma Real Magic SCSI 409
Sigma Real Magic VGA 369

PC SPEAKERS

Altec Lansing ACS100 Pair 125
Altec Lansing ACS200 Pair 199
Altec Lansing ACS300 System 289
Sony Presenters speakers ALL

CD-ROM DRIVES

MediaVision Reno 180ms int. 279
NEC CDR-400 portable 3XP 439
NEC CDR-500 internal 3XP 479
NEC CDR-600 external 3XP 569
Plextor 3028 int 240ms 295
Sony CDU-33A01 int dsl speed 180 199
Sony CDU-561 285ms SCSI int. 299
Sony CDU7811 285ms SCSI ext. 399
Toshiba TQM-4101-85 int. 224
Toshiba TQM-4101-LI ext. 285
Toshiba TQM-3401-B int. 369
Toshiba TQM-3401-E1 ext. 435

CD-ROM SOFTWARE

Corel Draw 4.0 349
Microsoft Office V4.0 469
Microsoft Office Pro 509

OPTICAL DRIVES

Panasonic LF5014 WORM 2049
Panasonic LF5004 0.5" 120mb 865
Panasonic LF7304 1.5" 95.52" 2349
Pinnacle Tahoe-130PC 128MB 1119
Pinnacle PMA0130AT 3.5" 130mb 1719
Pinnacle PMA0650 5.25" 650mb 3079
PU Infinity Optical 3.5" 21mb int. 319
PU Infinity 3.5" 120mb int. 1249
Sony 3.5" 120mb rewrite ext. 1299
Sony 5.25" 650MB rewrite int. 1929
ValueStar Super 21MB Optical ext. 399
ValueStar Super 21MB Optical port 429

SOUND BOARDS

ATI Stereo FX-CD 109
ASP Upgrade for Sound Blaster 59
Logitech SoundMan 16 105

MP ACCESSORIES

Paper Cass Trays IN-STOCK
Toner for all models CALL

IBM

Execjet II 4078 279
Jetprinter PB4078 2499
Laser 5E 655
Laser 10 / Laser 10R 1119/1339
Laser 10R Digits / Ltr 12R 1499/1894
Laser 12L / Laser 15L 2399/2899

NEC

P3200 / P3300 225/322
Jetmate 1000 289
P6200 / P6300 399/599
SuperScript 610 575
SuperScript 640 785
Silentwriter 1097 1419

CANON

BJ108X 239
BJ200E / BJ230 289/389
BJC-600 579
BJC800 / BJC820 1489/1599
LBP430 / LBP660 589/1323

CITIZEN

Notebook Printer II 309

COMPAQ

Pagermark 15 2599
Pagermark 20 3749

DICONIX

Kodak 180si 219
Kodak Color Ease Dye Transfer 5399

EPSON

FX870 / FX1170 267/355
LQ570+ / LQ670 245/444
LQ1070 / LQ1170 365/611
LQ2550 896
DFX5000 / DFX8000 1327/2299
Action 1000 / Action 1500 598/649
Action 2250 / Action 3250 119/174
Stylus800 279

HEWLETT PACKARD

Deskjet 310 318
Deskjet 500 / 520 259/299
Deskjet 550C 479
Deskjet 1200C 1379
Laserjet 4P 988
Laserjet 4M 1308
Laserjet 4SI 2978
Laserjet 4SIMX 4479
Paintjet XL300 2258

HP ACCESSORIES

Paper Cass Trays IN-STOCK
Toner for all models CALL

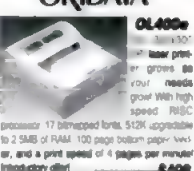
IBM

Execjet II 4078 279
Jetprinter PB4078 2499
Laser 5E 655
Laser 10 / Laser 10R 1119/1339
Laser 10R Digits / Ltr 12R 1499/1894
Laser 12L / Laser 15L 2399/2899

NEC

P3200 / P3300 225/322
Jetmate 1000 289
P6200 / P6300 399/599
SuperScript 610 575
SuperScript 640 785
Silentwriter 1097 1419

OKIDATA



OL4000 5498
184 Turbo 219
320 / 321 299/419
520 / 521 369/486
590+ / 591+ 419/569
395 / 395C 959/1029
498/899
Pacemaker 3410 1199
OL410a 679

PANASONIC

KXP2180 / KXP2023 178/179
KXP2123 239
KXP2124 / KXP1824 318/385
KXP1654 / KXP2624 569/399
KXP4410 / KXP4430 Laser 549/678
KXP4440 Laser 1029
KXP5400 Laser 839
KXP5410 Postscript Laser 1219

QMS

420 Postscript 1199
860 Hammerhead 3989
890+ Hammerhead 5249
Colorscript 210 / 230 4499/7199
Colorscript 1000 Ctr Ltr 4459

SEIKO

Smart Label Printer: DOS/Win 139
Smart Label Printer Pro 239
CH-4104PSE Color Pictscript 2449

STAR

NX1040R / NX2430 159/239
Starjet 48+ 289

TEXAS INSTR.

MicroMac Inkjet 300pc 277
MicroWriter Basic 5ppm 517
MicroWriter P523 5ppm 677
MicroWriter P685 5ppm 928
MicroStar Pro P523 800dpi 13167
MicroStar Pro P685 800dpi 1616

WIN SOFTWARE

ACT! 1.1 for Windows 249
Adobe Illustrator 4.0 419
Adobe Photoshop 2.5 569
Aldus Freehand 3.1 369
Aldus Pagemaker 5.0 549
AutoCAD Lite 423
Borland C++ 4.0 / Turbo C++ 3.1 329/75
Borland Office for Windows 369
Borland Paradox for Win 4.5.139
Borland Quattro Pro V5.0 47471
CA-Smart Accounting 65
Caere Omnipage Direct 179
Caere Omnipage Pro 2.1 457
Caere WordScan Plus 2.0 379
Central Point Backup 7.2 85
Central Point PCTools Win 99
Corel Draw 4.0 375
Corel SCSI Software 74
Corel SCS Pro V2.0 317
Crosstalk Bundle w/Crosstalk Win 129
Dalma Perform Pro + 1.0 235
Dalma Winfax Pro 3.0 77

DOS SOFTWARE

ACT! 2.1 for DOS 248
CA-BPI Integrated 147
CA-Clipper V5.2 Upgrade 139
CA-Simply Accounting 85
Borland Applesoft II 1.5 339
Borland dBase IV 2.0 519
Borland Framework IV 1.0 469
Borland MultiMate 4.0 239
Borland Paradox 4.5 519
Borland Quattro Pro 5.0 42
Central Point Anti-Virus 1.0 85
Central Point Backup 8.0 99
Central Point PC Pro 9.0 85
DAC Easy Accounting 4.4 89
DAC Easy Bonus 4.4 145
Design CAD 3D 4.0 2395
Fortune 500 on Disk 349
Genetic CAD 6.1 285
Harvard Graphics 3.0 369
Lotus 1-2-3 2.4 325
Lotus 1-2-3 3.4 398
Lotus Symphony V3.0 465
Microsoft C++ Compiler 7.0309
Microsoft Foxbase Plus 2.10 239
Microsoft FoxPro 2.5 299
Microsoft Project 4.0 299
MultiMate 4.0 239
Norton Backup 2.2 94
Norton Desktop 4.0 113
Norton Utilities 7.0 112
PC Anywhere 4.5 Host/Rem 114
Peachtree Complete V7.0 175
Procomm Plus 2.01 699
Professional File 2.0 169
Professional Write 2.2 159
Q & A 4.0 245
QuickBook with QuickPay 115
QuickWin 7.0 41
R Base 4.5 459
Stacker 3.1 89
Timeslips 5.0 179

WordPerfect \$1X.00

for Windows
It gives you the power
and flexibility to create the
documents you want. The
way you want. You'll complete
your tasks with fewer steps
and less time because
WordPerfect adapts to your
style of working. ONLY \$279

Word Perfect Add'l License 159
Word Perfect Office 259
Wordstar 7.0 259
Xtreme Gold 3.0 91

MIDWEST SELLS NOTEBOOKS FOR LESS!



TravelMate™ 4000E
WinDX2™ /50
Only \$2999

TEXAS
INSTRUMENTS



TravelMate™ 4000E
WinDX4™ /75
Only \$3749

ACCELERATE PRODUCTIVITY
IN A SINGLE BOUND!



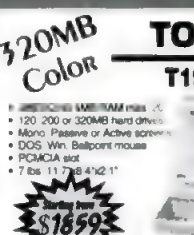
TravelMate™ 4000E
WinDX2™ /50
Only \$3749

TEXAS
INSTRUMENTS

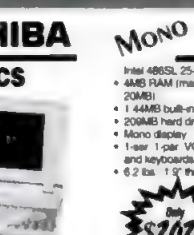


TravelMate™ 4000E
WinDX4™ /75
Only \$3749

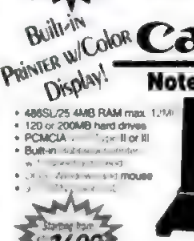
ACCELERATE PRODUCTIVITY
IN A SINGLE BOUND!



TOSHIBA
T1950CS
320MB Color
Only \$1859



COMPAQ
Contura 486SL25
Mono
Only \$2029



Canon
NoteJet 486
Built-in Printer w/Color Display!
Only \$2699



COMPAQ
Contura 486SL25
Color
Only \$2359



CALL FOR
FREE
CATALOG!

DIRECT
ORDER
LINE
1-800-85-WORKS
FAX 1-708-459-6933
Customer Service 1-708-459-9410
CIRCLE 010 ON READER SERVICE CARD
(1-800-859-6757)

PC MAG MAY 17, 94

meters: the name of the table for which the index is being created, the name of the .CDX file, and the name of the file in which to store the generated source code.

For example, to generate source code to re-create the index tags for a Sales table with an associated .CDX file, you could use

```
DO RECDX WITH "SALES.DBF",
"SALES.CDX", "SALESCDX.PRG"
```

When the command finishes, SALESCDX.PRG will contain source code to re-create the index. The code will be similar to

```
USE SALES.DBF EXCLUSIVE
SET INDEX TO SALES.CDX
DELETE TAG ALL
INDEX ON A TAG A OF SALES
INDEX ON B TAG B OF SALES
INDEX ON ...
...
FLUSH
USE
RETURN
```

As you know, FoxPro lets you create two types of compound index files: structural or independent. A structural .CDX is automatically opened when you open the corresponding table (.DBF), and it carries the same filename as the table. An independent .CDX is not automatically opened; you must do that yourself. The code generated by RECDX doesn't presume a structural .CDX, which is why the

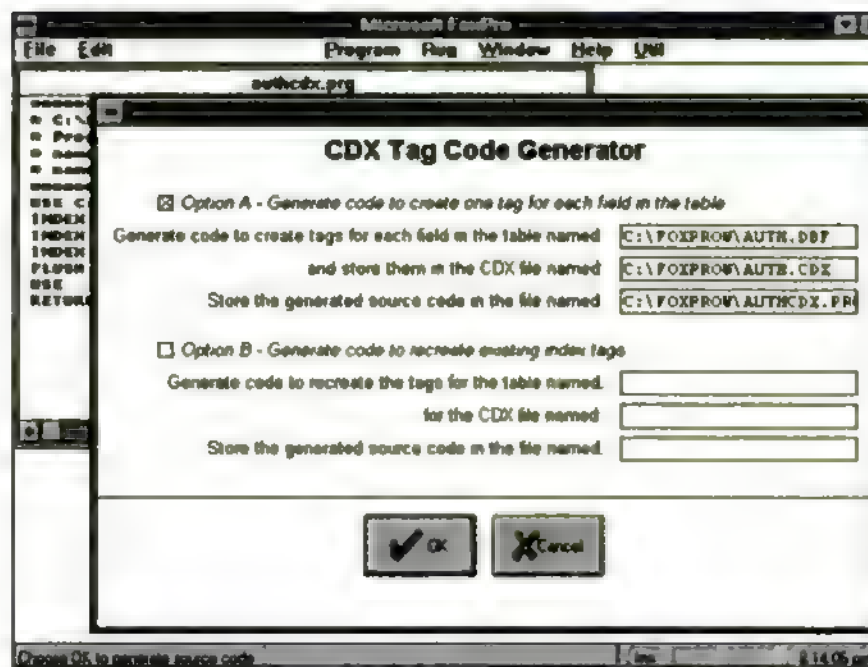


Figure 3: The CDXCOD.SCX dialog provides a user-friendly front end for the RECDX and GENCDX programs.

SET INDEX TO command is used. Thus, if the .CDX is independent, the SET INDEX TO command opens it. If the .CDX is structural, the SET INDEX TO command has no effect, since the index file is already open.

One INDEX ON command is generated for each index tag. When the INDEX ON command is run, it creates a new index tag, which sets aside any tag that already exists with the same name. FoxPro does not automatically delete the old tag, however. To free up the disk space, you must use the DELETE TAG ALL command. RECDX generates this command before generating the INDEX ON commands.

The RECDX program uses the TAG() function to return each tag name and the SYS(14) function to return the associated

index expressions.

I often use another routine that's similar to RECDX to generate code to create index tags (see Figure 2). Rather than using the tag names and expressions from an existing .CDX file, GENCDX generates one tag for each indexable field in a table, using the field name as both the tag name and the index expression. This is often useful when you've just created a new table or when you've become the lucky recipient of a table with no associated .CDX.

The GENCDX program uses the FCOUNT() function to return the number of fields, and then invokes the FIELD() function to return each field name. A field whose type is G (general), M (memo), or P (picture) is ignored, since it can't be indexed.

In order to make calling RECDX and GENCDX easier, I used FoxPro's Screen Builder to create the CDXCOD front end shown in Figure 3. To use it, just fill in the blanks and then choose the OK button; CDXCOD then calls RECDX or GENCDX or both, as required.

The CDXCOD.SCX screen file and the RECDX and GENCDX programs can be downloaded from PC MagNet. Look for CDXCOD.ZIP in the Sol: Spreadsh/DBMS section in the Utilities/Tips Forum.

—Sal Ricciardi

GENCDX.PRG

Complete Listing

```
.....
* GENCDX.PRG                                FoxPro 2.5
*
* Generate code to create a CDX file, one tag for each field. The
* field names are used for the tag names.
* Sample call: DO GENCDX WITH cGentable, cGencdx, cGenprg
* where cGentable is the DBF whose fields will provide the tags
*       cGencdx is the CDX file where the tags will reside
*       cGenprg is the file for the generated source code
*
.....
PARAMETER cGentable, cGencdx, cGenprg
IF EMPTY(cGentable) OR EMPTY(cGencdx) OR EMPTY(cGenprg)
  ? "GENCDX - Generate code to create index tags, one for each field"
  ? "Example: DO GENCDX WITH cGentable, cGencdx, cGenprg"
  RETURN
ENDIF

SET TEXTMERGE ON                && Turn textmerge on
SET TEXTMERGE TO (cGenprg)      && Send merged output to prgfile
SET TEXTMERGE NOSHOW

nWorkarea = SELECT(0)           && Save the current work area number
SELECT 0                         && Select a work area
USE (cGentable) AGAIN           && Open table
```

```
.....
\* <<cGenprg>>
\* Program to create index tags for fields in the table
\* named <<cGentable>>, and store them in the CDX file
\* named <<cGencdx>>
\*.....
\USE <<cGentable>> EXCLUSIVE      && Open table
*
* For each field in the table, output an INDEX command
* to create an index tag
*
FOR x = 1 TO FCOUNT()
  cField = FIELD(x)
  IF !INLIST(TYPE(cField), 'G', 'M', 'P')
    \INDEX ON << cField >> TAG << cField >> OF <<cGencdx>>
  ENDIF
ENDIF
\*.....
\FLUSH
\USE                                && Close table
\RETURN

USE                                && Close table and cdx file
SET TEXTMERGE OFF                  && Turn textmerge off
SET TEXTMERGE TO
FLUSH
SELECT (nWorkarea)                 && Return to the proper work area
RETURN
```



Figure 2: The GENCDX program generates source code to create one index tag for each field in the source table, using the field name as the tag name and index expression.

For Printers, It's Arlington!



OKIDATA®

Tank Tough®

OKILASER 400e



\$495.00

- 4 PPM
- 300 DPI
- 512K Ram
- RISC Processor
- Emulated HP IIP
- 44 Resident Fonts

OKILASER 410e



600 DPI
Class Output

- HP III Compatible
- 2 MB Ram

\$659.00

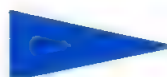
OL810-\$899 OL830-\$1089 OL850-\$1189

MICROLINE 590



- 24 Pin
- 360 CPS Draft
- 120 CPS L.Q.
- 8 Fonts

ML320	\$295	ML591	\$569
ML321	\$415	ML395	\$959
ML380	\$209	ML395C	\$1029
ML520	\$369	ML3410	\$1199
ML521	\$489	DocIt 3000	\$2389
ML590	\$415	DocIt 4000	\$2899



Canon

BJ-200e

Introducing the new BJ-200e with improved enhancements to the BJ-200, which was the November 1993 PC Magazine's Editors' Choice.



- Up to 33% faster text throughput
- Dramatically improved graphics
- 20 true type fonts
- Reduction mode added

\$285.00

BJ-600 — \$569.00

Great Color All Around. Whether you're printing text, graphics, or even photographs, the BJC-600 will give you sharp and vivid 360 dpi color output



- Perfect on plain paper.
- 20 Scalable Fonts.
- Color without going into the red. A separate ink cartridge for each color, so you don't have to replace all other colors when one runs out.

LBP-430 — \$579.00 LBP-860 — \$1329.00
BJ-10SX - Portable — \$239.00

BJ-230 - Wide Carriage — \$389.00

Notebook 486-SL-120 MG — \$1489.00

Notejet 486-85 MG — \$2138.00 Dual Scan Color!!! — \$1999.00
Notejet 486-135 MG — \$2349.00 Notejet 120 MG — \$2749.00
Notejet 486-180 MG — \$2549.00 Notejet 200 MG — \$3049.00



EPSON®

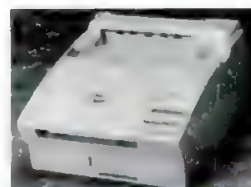
FX870	\$259	LQ1170	\$589
FX1170	\$345	LQ2550	\$879
LQ570+	\$235	DFX5000	\$1299
LQ870	\$425	DFX8000	\$2189
LQ1070+	\$355	Action 3250	\$169
Action Laser 1000	\$579		
Action Laser 1500	\$639		
Action Laser 1500-2MG	\$689		
Stylus 300	\$239		
Stylus 800 - After Rebate	\$255		



ACTION NOTE 486 SLC2-50

- 120 MG Drive
- 4 MG RAM
- Fax Modem

\$1489.00



ACTION LASER 1500

- 6 PPM
- 27 Fonts
- PCL5 Compatible
- PC Computing - "Best PCL5"



STYLUS 800

- Inkjet at 360 DPI
- 7 Scalable Built-In Fonts
- Byte Best Winner
- Rebate Until 5/31/94

FOR ORDERS & QUOTES:

800-548-5105

Arlington
Computer
Products, inc.

For Value, It's Arlington!

**COLORADO
MEMORY SYSTEMS INC.**

TRAKKER 250

Just plug it
into a
Parallel Port!

\$315.00



JUMBO 250

\$159

One of the top
tape back-ups
available at an
incredible price!

Colorado Jumbo 120.....	\$99	Colorado Trakker 250	\$315
Colorado Jumbo 250.....	\$159	Colorado 2GB Ext.....	\$1069
Colorado Trakker 120	\$275	Qic 80 Tapes	\$21

**PRACTICAL
PERIPHERALS**



14.4 Mini Tower

Practical Per. 9600 Int. ...	\$139
Practical Per. 9600 Ext. ...	\$149
Practical Per. 14.4 Int.	\$149
Practical Per. 14.4 Ext.	\$159
Practical Per. 14.4 Ext. S/A	\$359
Practical Per. 14.4 Pocket	\$269
PCMCIA 14.4	\$265

Robotics

14.4 Sportster External W/Fax
• V.42/MMP • 5 Year Warranty



WIN
FAX
LITE

Sportster 14.4 Int.	\$145
Sportster 14.4 Ext.	\$159
Sportster 14.4 Int. Fax ...	\$149
Sportster 14.4 Ext. Fax ...	\$169
Terbo 14.4 Dual Std.	\$679
V.32 Turbo Fax	\$379
V.32 Turbo Fax Int.	\$345
PCMCIA 14.4	\$239

CHIPS

1MB/4MB Simms	\$49/\$159
Compaq Memory	CALL
Epson Action 2 MG	\$99
Cyrix SRx2-20/40	\$219
Cyrix DRx2-20/40	\$279
Cyrix DRx2-25/50	\$329
Cyrix DRx2-33/66	Call
HP 4MG Upgrade	\$159
Intel 80387 SX	\$75
Intel 80387 DX	\$85
OKI Laser 2MB	\$125

Double Time

Intel Ov.Drv.Dx2-25/33	295/389
Intel Ov.Drv.SX-20/25	279/279
Kingston SX/Now 386-25	\$169
Kingston SX/Now 386-33	\$199
Kingston 486 Now-25 MHz	\$389

BATTERY BACK-UP

AMERICAN UPS

250	\$99	1250	\$485
400	\$155	Smt.400	\$279
450	\$185	Smt.600	\$335
600	\$259	Smt.900	\$529
900	\$369	SM-1250	\$679

TRIPPLITE

BC250/400	\$95/\$145
BC400/500 Lan	\$139/\$185
BC600/750	\$239/\$299
Omni 500/600	\$249/\$295
Omni 750/1250 Lan	\$395/\$595

**Arlington
Computer
Products . inc.**

NETWORKING

Network Lite	\$69
Network 3.12 5 User	\$579
Network 3.12 10 User ...	\$1299
Network 3.12 25 User ...	\$1899
Network 3.12 50 User ...	\$2349
Network 3.12 100 User ..	\$3349
Network 4.0 10 User	\$1959
Network 4.0 25 User	\$2899
Lantastic Starter 5.0.....	\$409
Node Runner 2000C	\$169
Node 2000C 12-Pack	\$1859
Node Runner SI 2000	\$85
Node Runner SI 5-Pack ..	\$425
T Runner 8-Port	\$289
T Runner 12-Port T/P ...	\$479
Central Station	\$385
E143 Ethernet	\$185
NE2000/5-Pack	\$89/\$349
SMC Hub 8 Port T/P	\$319
SMC TP 12 node Conc.	\$579
SMC+16-6 Pack	\$579
SMC Ethercard +/-16	\$89/\$115
3 Com EtherLink II 16	\$155
3 Com Etherlink III	\$115
Etherlink III 5 Pack	\$519
Intel Ether 16	\$89
Intel Ether 16-5 Pack	\$429
Intel Ether Flash 5-Pack ..	\$479
Intel Ether 16-20 Pack ...	\$1629
Intel Eth.Cmbo/5-Pk	\$115/\$539
Intel Netport II	\$359
Intel Token 16/4	\$389
Thomas Conrad 5143 Coax	\$119
TC 5143 Coax 6-Pack	\$679
TC 5143-10 BT	\$95
TC 5143-10 BT 6 BK	\$479
TCNS 100 Mbps	\$435
Xircom Pocket Ethernet ..	\$249
Xircom PCMCIA Ethernet	\$259

HEWLETT-PACKARD

Laserjet IV w/Toner	\$1369
Laserjet IVP w/Toner	\$989
Laserjet IVMP w/Toner ...	\$1379
Laserjet IVL w/Toner	\$675
Laserjet IVML/w/Toner ...	\$1039
Laserjet IVM w/Toner ...	\$1929
Laserjet IV SI w/Toner ..	\$2989
Laserjet IV SI MX	\$4499
HP IV Toner	\$99
Jet Direct 2371A	\$389
Jet Direct 2371B	\$429
1MG Upgrade	\$69
2MG Upgrade	\$99
4MG Upgrade	\$159
8MG Upgrade	\$329
Deskjet 256K	\$69
Deskjet 310	\$299
Deskjet 500/550C	\$299/\$569
Deskjet 520/560C ...	\$299/\$579
Deskjet 1200C	\$1399
Deskjet 1200C/PS	\$2029
2P Scanner	\$719
IIC Scanner	\$979
Pacific Page/XL	\$259/\$699
Pacific Data 25 in 1 Font	\$239

TEXAS INST.

486/WINSX 120	\$1835
486/WINSX 25 Color	\$2099
486/DX2/50-200 MG	\$2639
486/DX2/40 Color	\$2889
486/DX2/50E Color	\$3749
MicroWriter Basic	\$519
MicroWriter PS23	\$675
MicroWriter PS65	\$935
Pro 600 PS23	\$1329

LEXMARK

Laser Printer 6	\$929
Laser Printer 10	\$1109
Laser 4039 10R	\$1329
Laser 4039 12R	\$1679
Inkjet 4076	\$279
2380+/2381+	\$305/\$435

AST NOTEBOOKS

170MB Mono/Color	\$1789/\$2425
170 MG Color+	\$3149
Power Exec 200 MG	\$2399
Power Exec 200 MG-Active	\$3939

SOFTWARE

Aldus Pagemaker 5.0.....	\$519
Corel Draw 4.0	\$359
Corel Draw 4.0 Upgrd	\$209
D Base IV	\$409
Harvard Graphics	\$245
Lotus 123 2.4/3.4 ...	\$279/\$325
Lotus 123 4.0	\$279
Lotus Smart Suite	\$399
Microsoft Access 1.1	\$295
Microsoft Office	\$449
Microsoft Word	\$289
Microsoft Windows 3.1	\$69
Microsoft DOS 6.0 Upg.	\$59
Norton 7.0	\$109
Q&A	\$175
QEMM	\$65
Word Perfect 6.0	\$249
Word Perfect Windows ...	\$269
Win Fax Pro	\$75
Word Perfect 6.0 Upgrd ...	\$99

Panasonic
Office Automation

11241 ...	\$229	2624 ...	\$389
2023 ...	\$199	3123 ...	\$279
2123 ...	\$229	4410 ...	\$535
2124 ...	\$295	4430 ...	\$639
2180 ...	\$169	4440 ...	\$999
1624 ...	\$379	4455 ...	\$1499
4410/4450I 2 MG...\$129			

NEC

Jetmate 1000	\$269
P6200/P6300	\$399/\$599
P9300	\$825
Superscript 610	\$569
Model 95/95FX	\$869/\$1079
Model 1097	\$1349

SCAN. & DIGIT.

Calcomp 12 x 12-4	\$299
Calcomp 12 x 18-16	\$399
Epson Scanning 600	\$759
Epson Scanning 800	\$999
Epson Professional	\$1199
Logitech ScanMan 256 ...	\$169
Color ScanMan	\$409
ScanMan w/Omni Page ...	\$185
Summasketch 12x12	\$269
Summasketch 12x18	\$499

FOR ORDERS & QUOTES:

800-548-5105

intel Modems

Along with connecting you to an audience of millions, Intel Fax Modems provides outstanding value.

Fax Modems



24/96 Int.	\$58.00	96/96 Int.	\$129.00	14.4/14.4 Int.	\$135.00
24/96 Ext.	\$119.00	96/96 Ext.	\$149.00	14.4/14.4 Ext.	\$155.00

SatisFAXtion MODEMS

200 2400 V.42/9600 Fax	\$199.00	400 14.4/14.4 Fax	\$258.00
300 14.4/9600 Fax	\$219.00	400 Ext. 14.4/9600 Fax	\$295.00

PC MCIA MODEMS

Take your office with you wherever you go. The Intel PCMCIA Fax-modem is a credit card-sized adapter that inserts into a computer's PCMCIA slot.

24/96	\$149.00
14.4/14.4	\$258.00

Hayes®

The Hayes Communications Superstars!

ACCURA — Accura Modems continues the Hayes reputation for high quality performance.

14.4 Int. —	\$149.00
14.4 Ext. —	\$159.00



OPTIMA — The perfect choice for your communications needs!



OPTIMA

Optima 96	\$309.00
14.4+ Fax	\$349.00
Pocket 14.4	\$299.00
28.8	\$409.00



PCMCIA 14.4+ Fax
Stay in touch on the road!
Smartcom & Windows Fax!
\$289.00

MONITORS



FLAT SCREENS

NEC

FGE/3 V	\$549/459
FGE	\$599
FGP	\$1089
FGE	\$969
FGP	\$1959

CTX

5468A/1451	\$249/\$269
1561/1760	\$349/\$659

MAG

LX1450 14"	\$309
MX15F 15"	\$495
MX17F 17"	\$879

MITSUBISHI

EGA-1430C	\$279
Diamond Pro 17	\$999
Diamond Scan 15 FS	\$479
Diamond Pro 21 FS	\$2149
HL6955 20"	\$1759

NANAO

F3401W	\$659
F5501/F5501W	\$995/\$1089
T5601/F5601W	\$1649/\$1329
F7601W	\$2029

SONY

CPD-1604S	\$939
CPD-1730 17"	\$999
GDM 2036S	\$1999

VIEW SONIC

15/17G	\$429/\$799
17"	\$949
20/21"	\$1529/\$1789

DRIVES & TAPES

Back Pack 250	\$339
Back Pack 200 MG Drive	\$429
Colorado Trakker 250	\$315
Connor 250 Tape	\$149
Connor 212/540	\$239/\$639
Teac Dual Floppy	\$119
Toshiba 3 1/2" 1.44	\$69

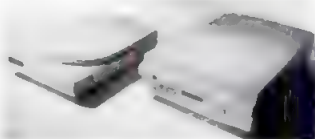
QUANTUM

LPS 270	\$259
540-IDE/SCSI	\$555/\$585
PD-1050/SCSI	\$919

SEAGATE HARD DISKS

130 MG 3145A	\$189
260 MG 3290A	\$225
341 MG 3390A	\$299
420 MG ST1480A	\$339
452 MG 3550A	\$379
535 MG SCSI 3655N	\$549
2100 MG SCSI 42400	\$1799

CD ROM



NEC - TRIPLE SPEED

NEC 3Xe	\$549
NEC 3Xi	\$439
NEC 3Xp/4X Pro	\$419/\$899
Chinon 535 Int/Ext.	\$305/\$389
Fusion Double CD	\$369
Soundblaster 16 SCSI 2	\$179
Pioneer 6 Disc Quadro	\$1339
Texel 3028 Int/DS	\$289
Texel 5028 Ext/DS	\$329

VIDEO BOARDS

ATI Graph Ultra + 2MG	\$229
ATI Graph Prof 2 MG	\$329
Diamond Stealth Pro	\$239
Diamond Viper 2 MG	\$389
Hercules Dynamite VLB	\$155
Hercules Graphite 2MG	\$369
1024 VGA 16 Bit	\$59

ARLINGTON COMPUTER PRODUCTS... GREAT SERVICE SINCE 1984!

- PC Magazine "...Arlington offers worry-free mail order purchasing!"
- PC Sources Review "...You can be confident that what you order will work!"
- PC Computing "...Courteous service and terrific technical support!"
- PC Computing Mail Order Review of Peripheral Specialists 8/93. We received the only 5 Star Rating for Price!

Prices and availability subject to change without notice. Qualified purchase orders accepted.

CIRCLE 336 ON READER SERVICE CARD

Hours C.S.T.
7:30-8:30 pm Mon-Fri
9:00-5:00 pm Saturday

1970 Carboy,
Mt. Prospect, IL 60056

NO SURCHARGE FOR CHARGE CARDS!

CUSTOMER SERVICE AND IN ILLINOIS

708-228-6333

SHIPPING

708-228-9748

TECHNICAL ASSISTANCE

708-228-1470

FAX

708-228-0516

Arlington
Computer
Products, inc.

FOR ORDERS & QUOTES:

800-548-5105

VTech Makes Buying Direct Easy...

486DX2/66 Multi-Media Hardware Feature Comparison

Feature	VTech	DELL	Gateway	Zeos
Memory	8MB	8MB	8MB	8MB
Hard Drive	426MB	450MB	424MB	426MB
Floppy Drives	3.5"	3.5"	3.5"	3.5"
Video	1 MB VLB	1 MB VLB	1 MB VLB	1 MB VLB
3 Year warranty	Yes	No	No	No
Double Speed CD-ROM	Yes	Yes	Yes	Yes
Sound Card & Speakers	Yes	Yes	Optional (\$132)	Optional (\$148)
Modem	Yes	Optional (\$79)	Optional (\$49)	Optional (\$49)
Remote Diagnostics Sftw.	Yes	No	No	No
Case	Full Size	Desktop	Baby AT	Desktop
External Cache	128K	128K	128K	No
Monitor	15"	15"	15"	Upgrade (\$95)
PC Computing Service Value Rating (Aug. 1993)	★★★★★	★★★★★	★★★★★	★★★★★
Price*	\$2099	\$3074	\$2476	\$2762

The VTech Multi-Media systems are available with VTech's integrated local bus or with our new VESA local bus. Each system also includes Compton's Interactive Encyclopedia, Webster's Dictionary and World Atlas which will turn your computer into a complete information center for the whole family.

BEST BUY

Expo 486SX33M

- Pentium Technology Ready
- 4MB RAM
- 250MB 13ms IDE Hard Drive
- Double Speed CD-ROM
- Stereo Sound Board
- Compton's Interactive Encyclopedia, Webster's Dictionary and World Atlas
- Local Bus Graphics with 1MB
- 3.5" Diskette Drive
- 14" VTech HiRez Monitor
- Full Size Metal Desktop Case
- 9600/2400 Data/Fax Modem
- Remote Diagnostics Software
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty

\$1429
\$1349 with 486SX25

Expo 486DX33VM

- Intel Verified: for the Pentium™ OverDrive™ Processor
- 4MB RAM with 128KB Cache
- 424MB 13ms IDE Hard Drive
- Double Speed CD-ROM
- 16-Bit Stereo Sound Board
- Compton's Interactive Encyclopedia, Webster's Dictionary and World Atlas
- VLB Graphics with 1MB
- 3.5" Diskette Drive
- 15" VTech HiRez Monitor
- Full Size Metal Desktop Case
- Dual Cooling Fans
- 9600/2400 Data/Fax Modem
- Remote Diagnostics Software
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty

\$1749
\$1799 with 486DX2/50

Expo 486DX2/50VM

- Intel Verified: for the Pentium™ OverDrive™ Processor
- 8MB RAM with 128KB Cache
- 424MB 13ms IDE Hard Drive
- Double Speed CD-ROM
- 16-Bit Stereo Sound Board
- Compton's Interactive Encyclopedia, Webster's Dictionary and World Atlas
- VLB Graphics with 1MB
- 3.5" Diskette Drive
- 15" VTech HiRez Monitor
- Full Size Metal Desktop Case
- Dual Cooling Fans
- 9600/2400 Data/Fax Modem
- Remote Diagnostics Software
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty

\$1999
\$2099 with 486DX2/66

Expo 486DX2/66VM

- Intel Verified: for the Pentium™ OverDrive™ Processor
- 16MB RAM with 128KB Cache
- 527MB 12ms IDE Hard Drive
- Double Speed CD-ROM
- 16-Bit Stereo Sound Board
- Compton's Interactive Encyclopedia, Webster's Dictionary and World Atlas
- VLB Graphics with 1MB
- 3.5" Diskette Drive
- 15" VTech HiRez Monitor
- Full Size Metal Desktop Case
- Dual Cooling Fans
- 9600/2400 Data/Fax Modem
- Remote Diagnostics Software
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty

\$2499

Multi-Media Systems You Can See and Hear

In 1993 Computer Shopper singled out VTech as one of the fastest growing companies in the PC industry. The reason is simple, we are the manufacturer - not an assembler of someone else's components - which means we can truly deliver-
"Technology at Prices You Can Afford."

- VTech designs and manufactures our own components so we control the quality, features and performance.
- With over 11,000 employees and 3 research and engineering labs VTech has the technology and resources to build incredible systems.
- Our prices are among the lowest in the industry because we supply systems to some of the largest manufacturers in the world and that helps us keep production high and prices low.
- 3 year warranty - PC Computing gave VTech a 5 Star Service Value Rating beating out Dell, Gateway, ZEOS, IBM and Compaq.

VTech®
expotech

expotech series



Hot New VESA Systems...



The Expo 486 VESA Multi-Media system

Prices You Can't Beat

The VTech VESA systems have been specially optimized to deliver the speed and graphics performance that today's Windows applications demand. Each system is equipped with two VESA slots and extra attention has been placed on system compatibility with a wide range of VESA cards. These systems deliver great Windows performance and the extra features you want, at prices you can afford.

The ExpoTech family of VESA systems is available with a wide range of processors, hard drives and memory combinations. All VTech systems are covered by a 3 year warranty and include the extra features and support VTech is known for.

- 2 VLB Slots
- Novell Certified
- Advanced case design with dual cooling fans
- 30 day money back guarantee

The VTech VESA systems are loaded with extra features. Dual Cooling Fans keep the processor, system board, and option cards cool. This means if you upgrade to the Pentium™ OverDrive™ Processor it will be safe and reliable. In fact, these systems have been Intel Verified: for the Pentium™ OverDrive™ Processor.

VTECH®
expotech™



expotech series

Expo 486SX33V

- Intel Verified: for the Pentium™ OverDrive™ Processor
- 4MB RAM
- 250MB 14ms IDE Hard Drive
- VLB Graphics with 1MB
- 3.5" Diskette Drive
- 14" VTech HiRez Monitor
- Full Size Metal Desktop Case
- Dual Cooling Fans
- 9600/2400 Data/Fax Modem
- Remote Diagnostics Software
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty

\$1199
\$1399 with 486DX33

Expo 486DX33V

- Intel Verified: for the Pentium™ OverDrive™ Processor
- 4MB RAM with 128KB Cache
- 424MB 13ms IDE Hard Drive
- VLB Graphics with 1MB
- 3.5" Diskette Drive
- 14" VTech HiRez Monitor
- Full Size Metal Desktop Case
- Dual Cooling Fans
- 9600/2400 Data/Fax Modem
- Remote Diagnostics Software
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty

\$1499
\$1549 with 486DX2/50

Expo 486DX2/50V

- Intel Verified: for the Pentium™ OverDrive™ Processor
- 8MB RAM with 128KB Cache
- 424MB 13ms IDE Hard Drive
- VLB Graphics with 1MB
- 3.5" Diskette Drive
- 15" VTech HiRez Monitor
- Full Size Metal Desktop Case
- Dual Cooling Fans
- 9600/2400 Data/Fax Modem
- Remote Diagnostics Software
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty

\$1649
\$1879 with 486DX2/66

Expo 486DX2/66V

- Intel Verified: for the Pentium™ OverDrive™ Processor
- 16MB RAM with 128KB Cache
- 527MB 12ms IDE Hard Drive
- VLB Graphics with 1MB
- 3.5" Diskette Drive
- 15" VTech HiRez Monitor
- Full Size Metal Desktop Case
- Dual Cooling Fans
- 9600/2400 Data/Fax Modem
- Remote Diagnostics Software
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty

\$2279

1-800-816-0070



Double Your Power...



"The Awesome VTech Platinum..."

Computer Shopper, February 1994

VTech is the first and only company to bring Symmetrical Multiprocessing to the desktop at prices that blow away even single processor systems. Just look what the experts are saying.

• "The overall performance of the VTech gave it the highest rating of any of the 486 systems, and the jaw dropping price is outstanding."

Computer Shopper, February 1994

• "VTech leads in PC Multiprocessing."

PC Magazine, October 12, 1993

• "This system costs less than many single Pentium™ platforms and its performance, at least under NT, would be 20 to 30 percent faster for any multithreaded application."

Computer Shopper, 1994

Only VTech can deliver your choice of advanced SMP and Pentium systems. Pentium systems are the next frontier of PC performance. If you have a need for speed the VTech Pentium systems will deliver. Utilizing the PCI bus the VTech systems deliver high power at breakthrough pricing.

VTech[®] expotech™

BEST BUY

Platinum Series

Platinum 486DX2/50

- Intel 486DX2/50 Processor
- Intel Verified: for the Pentium™ OverDrive™ Processor
- 8MB RAM
- 424MB 13ms IDE Hard Drive
- 256KB Copy Back Cache w/Cast Out Buffering
- SCSI II w/ built-in BIOS support
- 16550 Serial Port Controllers
- Multiprocessor Upgrade Slot
- S3 VLB Accelerator with 1MB
- 3.5" Diskette Drive
- 15" VTech HiRez Monitor
- Full Size Metal Desktop Case
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty

\$1949
\$2299 with 486DX2/66

Platinum 486DX2/66

- Intel 486DX2/66 Processor
- Intel Verified: for the Pentium™ OverDrive™ Processor
- 16MB RAM
- 424MB 13ms IDE Hard Drive
- Double Speed CD-ROM
- 256KB Copy Back Cache w/Cast Out Buffering
- SCSI II w/ built-in BIOS support
- 16550 Serial Port Controllers
- Multiprocessor Upgrade Slot
- S3 VLB Accelerator with 1MB
- 3.5" Diskette Drive
- 15" VTech HiRez Monitor
- Full Size Metal Desktop Case
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty

\$2749

Platinum 486DX2/66²

- Dual Intel 486DX2/66 Processors
- Intel Verified: for the Pentium™ OverDrive™ Processor
- 16MB RAM
- 527MB 12ms IDE Hard Drive
- Double Speed CD-ROM
- 256KB Copy Back Cache w/Cast Out Buffering
- SCSI II w/ built-in BIOS support
- 16550 Serial Port Controllers
- S3 VLB Accelerator with 1MB
- 3.5" Diskette Drive
- 15" VTech HiRez Monitor
- Full Size Metal Desktop Case
- Windows NT
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty

\$3599

Platinum P5-60

- Intel 60MHz Pentium™ CPU
- 8MB RAM with 256k Cache
- 424MB 13ms IDE Hard Drive
- PCI Local Bus Graphics with 1MB
- 3.5" Diskette Drive
- Enhanced Parallel Port
- High Speed Serial Port Controllers
- 15" VTech HiRez Monitor
- Full size Metal Desktop Case
- Double Speed CD-ROM
- MS-DOS 6.2 & Windows 3.1
- Quality Keyboard, Mouse
- Next generation P5T Pentium Overdrive Processor Ready
- Dual Cooling Fans
- Self Sensing setup for HD and memory
- 3 Year Warranty

\$2799
\$3299 with 16MB and 527MB HD

VTech Value Systems...



and Power Portables

The ExpoTech series of integrated systems from VTech have been our most popular systems. Their great combination of performance, features, and low price have made them the clear choice for anyone looking for great value.

Integrated means we've combined as many features and performance enhancements as possible into the main system board. This integration creates a well designed board with exceptional reliability and performance.



expotech series

Expo 486SX33

- Pentium™ Technology Ready
- 4MB RAM
- 210MB 12ms IDE Hard Drive
- Local Bus Graphics with 1MB
- 3.5" and 5.25" Diskette Drive
- 14" VTech HiRez Monitor
- Full Size Metal Desktop Case
- 9600/2400 Data/Fax Modem
- Remote Diagnostics Software
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 -Keyboard & Mouse
- 3 Year Warranty

\$1149
\$1129 with 486SX25

Expo 486DX33

- Pentium™ Technology Ready
- 4MB RAM with 128KB Cache
- 424MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- 3.5" and 5.25" Diskette Drive
- 14" VTech HiRez Monitor
- Full Size Metal Desktop Case
- 9600/2400 Data/Fax Modem
- Remote Diagnostics Software
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 -Keyboard & Mouse
- 3 Year Warranty

\$1469

Expo 486DX2/50

- Pentium™ Technology Ready
- 4MB RAM with 128KB Cache
- 424MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- 3.5" and 5.25" Diskette Drive
- 14" VTech HiRez Monitor
- Full Size Metal Desktop Case
- 9600/2400 Data/Fax Modem
- Remote Diagnostics Software
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 -Keyboard & Mouse
- 3 Year Warranty

\$1529

Expo 486DX2/66

- Pentium™ Technology Ready
- 8MB RAM with 128KB Cache
- 424MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- 3.5" and 5.25" Diskette Drive
- 15" VTech HiRez Monitor
- Full Size Metal Desktop Case
- 9600/2400 Data/Fax Modem
- Remote Diagnostics Software
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 -Keyboard & Mouse
- 3 Year Warranty

\$1799

The ExpoTech Notebooks offer a great combination of features and price. The removable hard drive provides versatility usually found only on systems costing hundreds more.

- Portable - Weighs less than 7lbs.
- Powerful - 4MB RAM and 120MB HD
- 9600/2400 Data/Fax modem
- 1 Year Warranty on Notebooks

ExpoNote 486SLC/33

- 4MB RAM, 120MB Hard Drive
- Removable Hard Drive
- 640x480 VGA with 64 grey levels
- Simultaneous External VGA port
- 3.5" Diskette Drive
- 9600/2400 Data/Fax Modem
- MS-DOS 6.0 & Windows 3.1
- Only 2.1"(H) x 11.4"(W) x 9.25"(D)
- Power management functions
- Full Size Mouse

\$1299
\$899 with 386SX/33
Modem not included in 386SX/33



VTECH®
expotech

7 days a week:
Central Standard Time
Mon.-Fri. 7:00am-6:30pm,
Saturday 9:00am-6:00pm,
Sunday 10:00am-3:00pm,
Fax 1-800-847-3976,
Government & Education
1-800-547-5451

Software, modem & service package for desktop & lower systems only. The Intel Inside Logo, Intel, Pentium and OverDrive are trademarks of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. All prices and configurations are subject to change without notice or obligation. Prices do not include shipping.

VTech Computers, Inc.,
800 Church Street,
Lake Zurich, Illinois 60047

1-800-816-0070

CIRCLE 305 ON READER SERVICE CARD

**SUPER
SELECTION**

VALUELINE

WHERE MORE THAN JUST THE PRICE IS RIGHT

**GREAT
SERVICE**

**IN ILLINOIS
(708) 933-1100**

- Your source for Hewlett-Packard, IBM and Macintosh
- CERTIFIED REPAIR SERVICES DEPARTMENT is AUTHORIZED ON EVERY PRODUCT WE SELL
- THOUSANDS of Software Titles IN STOCK

**BIG
SAVINGS**

**CALL TOLL-FREE:
1-800-700-1000
24 HOUR FAX LINE
(708) 677-7168**

Since 1977
VALUELINE has been in business
for over 14 years. We believe
VALUELINE will be here today and
tomorrow. We are committed to
product prices and service.

IBM

Model 5150	1099
Model 5150	1099
Model 5150	1099
Model 5150	1099
Model 5150	1099
Model 5150	1099
Model 5150	1099
Model 5150	1099
Model 5150	1099
Model 5150	1099

TOSHIBA

Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099

IBM PC

Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099

UPGRADES

Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099
Model 2860	1099

Packard Bell

486SX 33 210MB	\$899
486SX 33 260MB & TBU	1099
486SX 33 50 340MB	1249
486DX 66 420MB	1599
Pentium 60 8420MB	2499
486SX 25 210MB Multimedia	1199
486DX 66 420MB	1999
Multimedia & TBU	1999
Pentium 60 8420MB Multimedia	2799

Canon

Bravo LC 486DX 33 170HD	\$1349
Bravo LC 486DX 33 213HD	1449
Bravo MT 486DX 33 173HD	1449
Bravo MT 486DX 33 143HD	1849
Bravo Notebook 486 255X-123HD	1499
Bravo Notebook 486 1255X-173HD	1599
Active Notebook 486 255X-173HD	2999

PRINTERS

OKidata	
ML184 Turbo	\$235
ML380	205
ML300E	292
ML500	363
ML590	414

Canon

2023	\$190	4430 Laser	\$669
1400 LED	799	2624	399
1123	232	3173	259
1654	579	3124	333
2124	304	3824	388

Canon

BJ230	\$399	430 Laser	\$575
BJ200E	289	BJ105X	254
BJC600	565		

EPSON

LX810	\$154	AP2250	\$117
FX1170	359	DFX5000	1331
FX1170	359	DFX5000	1331
FX1170	359	DFX5000	1331
FX1170	359	DFX5000	1331

CONNER

340MB 14MS 3.5" HH IDE	\$299
545MB 10MS 3.5" HH IDE	599

Robotics

14.4 External Sportster	\$159
14.4 External Sportster Fax	179
14.4 Internal Sportster	149
14.4 Internal Sportster Fax	169
9600 External Sportster Fax	159
9600 Internal Sportster Fax	139
Worldport 9696 w/Fax	239
Worldport 14.4 w/Fax	259

PRACTICAL PERIPHERALS

2400 V 420ms w/Fax External	\$99
2400 V 420ms w/Fax External	108
14.4 Internal V 420ms w/Fax	149
14.4 External V 420ms w/Fax	169
14.4 Send Receive Pocket	299
9600 External w/Fax V 32	159
9600 Internal w/Fax V 32	139

Hayes

ACCURA 2400B Internal	\$62
ACCURA 14.4 Fax 144 Internal	159
ACCURA 96 Fax 96 Internal	149
ACCURA 14.4 Fax 144 External	169
ACCURA 96 Fax 96 External	159

intel

28.800BPS Internal	\$229
FAX Modem	
28.800BPS External	249
FAX Modem	
Fax Modem Series 14.4	
Internal w/Fax	149
Fax Modem Series 14.4	
External w/Fax	169
24.96 PCMCIA w/Fax Internal	179
96.96 PCMCIA w/Fax Internal	237
14.4 14.4 PCMCIA w/Fax Internal	285
SatsFAxion Modems	
100 Internal	94
400 Internal	268
400 External	305

TAPE BACK-UP & MEDIA

JUMBO 120	\$99
JUMBO 250	170
TRAKKER 120MB Portable	190
TRAKKER 250MB Portable	325
PowerTape 2 OGB Internal	934
PowerTape 2 OGB External	1060

MEGA

BERNOULLI PC Powered 90	\$325
BERNOULLI Insider 150	480
250MB Tape Back-Up	175

SYDOS

Sydos Pro Note 42MB Parallel	\$499
Sydos Puma 88MB Parallel	437
Sydos Martin 105MB Int IDE	579
Sydos 88MB Ext SCSI w Adapter	583
Sydos 88MB Int SCSI w Adapter	492

BATTERY BACK-UPS

BACKUP 250	\$299
BACKUP 400	339
BACKUP 450	359
BACKUP 600	399
BACKUP 900	499
BACKUP 1250	599

CD ROM DRIVES

SONY-CDL 56110	\$319
SONY-CDL 781110	449
NEC CDH 400 XP Portable	445
NEC CDR 500 XP Portable	432
NEC CDR 600 XE Portable	588
CREATIVE LABS OMNI CD KIT	249
CHINON CD535 Kit Int	369
CHINON CD535 Kit Ext	469
CHINON CD535 Kit Ext (MAC)	469

MEMORY UPGRADES

VALUELINE STOCKS KINGSTON & VIKING	
MEMORY FOR EVERY COMPUTER	
PRICES CHANGE. SO CALL US FOR YOUR BEST PRICE!	

FAX MACHINES

Panasonic FX-150 w/cutter	\$429
Canon Fax 17A	375
Canon Fax 16	299
Canon Fax 50 w/cutter	399
Sharp Fax Ux 184 w/cutter	329
Hewlett-Packard Fax 900 InkJet	749

MULTIMEDIA & CD'S

Pro-Audio Spectrum 16	\$129
Double Fusion CD Kit	449
Pro-Audio 16 Basic	99

CREATIVE

Sound Blaster Deluxe	\$79
Sound Blaster Pro-Deluxe	115
Sound Blaster MCD 16	149
Sound Blaster SCSI 16	169
Sound Blaster MCD ASP	189
Sound Blaster SCSI ASP	199

Labtec

Labtec CS 150 Speakers	\$19
Labtec SS 700 Speakers	36
Labtec CS 550 Speakers	29
Labtec CS 1000 Stereo Speakers	79
Labtec CS 1400 Speakers	99
Labtec CS 800 Speakers	39
Labtec CS 900 Speakers	79

ACS

ACS 200 Speakers	\$199
ACS 300 Speakers	285
ACS 50 Speakers	74
ACS 100 Speakers	126
AC10 Computer Audio Controller	179

TURTLE BEACH

Turtle Beach Multisound	\$499
Wave Card Synthesizer	154

Sound Galaxy BX

& MUCH MORE...

MULTIMEDIA SPECIALS!



\$489

Media Vision One of the industry's top performing multimedia upgrade kits, with:

- Fast, double speed SCSI WEC R41 CD-ROM drive
- Award-winning 16-bit Pro AudioStudio 16 Sound Card
- Microphone
- Advanced software & many CD-ROM titles!

Media Vision Double Fusion LX, Internal \$379
Media Vision Double Fusion CD16, Internal \$499
Media Vision Pro16 Multimedia SYS III, Internal \$779

SOUND CARDS

Media Vision	
Media Vision Pro Audio Spectrum Basic	\$99
Media Vision Pro Audio Spectrum 16	\$129
Media Vision Pro Audio Studio 16	\$161
Creative Labs	
Sound Blaster Deluxe	\$75
Sound Blaster Pro Deluxe	\$89
Sound Blaster 16 Basic Addition	\$139
Sound Blaster 16 Multi CD	\$166
Sound Blaster 16 SCSI-2	\$191
Sound Blaster 16 Multi CD with ASP	\$204
Sound Blaster 16 SCSI-2 with ASP	\$219
Creative Labs Accessories	
Wave Blaster Daughter Board	\$199
Advanced Signal Processor	\$59
Sound Blaster MIDI Kit	\$49

MULTIMEDIA KITS

Creative Labs	
Creative Labs Discovery 16-bit, Internal	\$439
Creative Labs Education 16-bit, Internal	\$508
Creative Labs Digital Edge CD, Internal	\$649

COREL



Corel Ventura The Best in Publishing!

Corel Ventura 4.2 features faster font loading and support for Adobe Acrobat, with the ability to create hypertext links. You'll also receive Ventura Database Publisher 4.2, Ventura Separator and Ventura Scan, plus templates that let you create a wide range of communication materials, over 600 fonts and more than 10,000 clipart images.

Corel Ventura, 3.5" Disk **\$169**
Corel Ventura, CD-ROM **\$149**



WE SET THE STANDARD:

- MEMORY GUARANTEED - 100%
- COMPATIBLE IN FORM, FIT, AND FUNCTION
- ALL PRODUCTS USER INSTALLABLE
- INSTALLATION INSTRUCTIONS INCLUDED WITH MOST MEMORY PRODUCTS
- FREE TECHNICAL SUPPORT
- THOUSANDS OF ITEMS IN STOCK
- CORPORATE PO'S, APO/FPO'S WELCOME
- GOVERNMENT AND EDUCATIONAL PRICING
- INTERNATIONAL ORDERS WELCOME
- SPECIAL VOLUME PRICING
- OVERNIGHT DELIVERY AVAILABLE
- NO SURCHARGE ON CREDIT CARDS

DON'T SETTLE FOR LESS!



800-501-9866

714-448-7750

714-448-7760

BUSINESS HOURS:

Monday - Friday, 7am-5pm, P.S.T.
Saturday, 9am-3pm, (Orders Only Please)



MAIL OR FAX ORDERS TO:

First Source International, Inc.
7 Journey
Aliso Viejo, CA 92656

First Source International, Inc. will gladly replace any defective or nonacceptable product within 30 days of the original purchase date. Excludes memory products for replacement only. Opened software is non-refundable. Returns are subject to a 20% restocking fee. Freight charges are non-refundable. A Return Merchandise Authorization (RMA) number is required for all returns; please contact our customer service department. Memory products are first-pull, first-shipped. A number is for your convenience. Due to U.S. tariffs placed on some manufacturers, memory pricing may be higher than elsewhere. Prices and availability are subject to change without notice. For shipping prices at the time of order are listed. First Source International cannot be responsible for errors in typographic or photographic trademarks and registered trademarks are of their respective companies.

VIDEO CARDS

Diamond

Switch 24 1MB ISA and VLB	\$149
Switch 1MB ISA and VLB	\$259
Switch Pro 2MB ISA and VLB	\$359
Viper VLB 2MB	\$399
Viper PO 2MB	\$459

ATI

Graphics Wonder Mach 32 1MB ISA and VLB	\$159
Graphics Ultra Pro 2MB ISA	\$229
Graphics Ultra Pro 2MB ISA and VLB	\$259

HERCULES



AWARD-WINNING SPEED COMBINED WITH HIGH RESOLUTION AND TRUE COLOR!

These VRAM based boards for ISA AND VLB computers support ultra-high refresh rates making extended work sessions more comfortable.

Graphics Pro ISA or VLB 1MB \$249

Graphics Pro ISA or VLB 2MB \$379

Fast DOS - Fast Windows - Runs Everything!

For ISA and VLB computers. Screening fast Windows parlor menu and complete compatibility with all E14000 drivers. 1MB, upgradeable or 2MB DRAM models.

Dynamite Pro ISA or VLB 1MB \$159

Dynamite Pro ISA or VLB 2MB \$199

HARD DRIVES

Seagate	
1040MB ST3120A, 15ms, 1H, 3.5" HDE	\$189
with 16-bit kit	\$209
1300MB ST314A, 15ms, 1H, 3.5" HDE	\$199
with 16-bit kit	\$219
2040MB ST320A, 10ms, 1H, 3.5" HDE	\$249
with 16-bit kit	\$269
1420MB ST41650H, 15ms, 5.25" SCSI	\$1219
with 16-bit kit	\$1369

PROCESSORS

Intel Math Coprocessors	
80387SX 16, 20, 25MHz	\$85
80387DX 16, 20, 25, 33MHz	\$89
80387SX Module 16, 20, 25MHz	\$85

Intel OverDrive Processors	
486SX20 with socket	\$325
486SX25 with socket	\$334
486SX25 without socket	\$340
486DX33 without socket	\$354
486DX33 or 486SX33 with socket	\$363

Cyrix	
Cx486DX2-16/22	\$269
Cx486DX2-20/40	\$319
Cx486DX2-25/50	\$349
Cx486DX2-16/22	\$269
Cx486DX2-20/40	\$369

CHINON



CHINON 535 CD-ROM DRIVES

Dual Speed, Multisession - A Multimedia Workhorse!

Exceeds MP2 and QuickTime standards
Multisession Photo CD compatible
720ms average access time
Double speed 300K/sec. data transfer rate
Features a 256K data buffer

CD-535 Internal with caddy w/o controller **\$349**
CD-535 External with caddy w/o controller **\$469**
CD-535 Internal with caddy, controller & cable **\$389**
CD-535 External with caddy, controller & cable **\$509**

CD-ROM DRIVES

Creative Labs	
Omni CD, Internal with controller/cable/software	\$229
Omni CD, External with controller/cable/software	\$379
MIC	
Multiple ZIP, Portable	\$449
Multiple ZIP, Internal	\$519
Multiple ZIP, External	\$599

KINGSTON



UPGRADE YOUR 386 TO A 386 OR 486!

SX/Now! 386 CPU upgrade	
25MHz (SX)	\$169
33MHz (SX)	\$199
SLC/Now! 386 or 486 CPU upgrade	
25MHz (SLC)	\$219
50MHz (SLC)	\$299
486/Now! 486 CPU upgrade	
25MHz (SX)	\$399
33MHz (DX)	\$579
MCMaster 486 CPU and up to 64MB or RAM	
25MHz (SX) DIMM	\$499
With 4MB add	\$181
33MHz (DX) DIMM	\$599
With 8MB add	\$354

FAX/MODEMS



PCMCIA 2.0 Data/Fax with XJACK	
14,400bps FAX/Modem	\$299
24/9600bps FAX/Modem	\$179
Packet Modems for any serial port	
14,400bps FAX/Modem	\$239
96/9600bps FAX/Modem	\$219



NEW Workport 14,400 fax, PCMCIA	\$269
Spartan 14,400 fax, External	\$173
Spartan 14,400 fax, Internal	\$156
Courier V.32 turbo fax with ASL, External	\$494
Courier V.32 turbo fax with ASL, Internal	\$365
Courier V.32 turbo with ASL, External	\$385
Courier V.32 turbo with ASL, Internal	\$345

TIMWORKS



NEW!
Version 4.0

Publish it! 4.0

Publish It! 4.0 for Windows is an easy-to-use desktop publisher with a spell-checker, thesaurus, OLE support, sample layouts, clip art, TrueType fonts and PowerPoint for creating special text effects.

Publish It! 4.0 **\$58**

MONITORS

Mitsubishi	
NEW SuperScan T50, 1280x1024 H @ 60Hz, 20mm	\$409
SuperScan T7, PST, 1280x1024 H @ 60Hz, 20mm	\$709
SuperScan 200, PST, 1280x1024 H @ 60Hz, 31mm	\$1429
IBM	
MicroScan 26, 14" 20 dot pitch, 1024x768	\$299
MicroScan 36+, 14" 28 dot pitch, 1024x768 H @ 72 Hz	\$399
MicroScan 36, 14" 28dot pitch, 10-m. RGB color adjust	\$349
MicroScan 40, 15" 28 dot pitch, Flat, 10-m. monitor	\$429
MicroScan 54, 17" 28dot pitch, Flat, 10-m. mon. display	\$819

800-501-9866

Kenosha Computer Center offers some of the Best

EXPERIENCE THE KENOSHA DIFFERENCE

- Over Six Years of Service
- Thousands of Satisfied Customers
- Terrific Technical Support
- Everyday Low Prices
- No Surcharge on Credit Cards

YOUR DIRECT SOURCE for SERVICE and VALUE. CALL US TODAY!

EPSON®

FX 870.....\$259	FX 1170.....\$345
LQ 570+.....\$235	LQ 870.....\$425
LQ 1070.....\$355	LQ 1170.....\$589
DFX 5000\$1299	DFX 8000\$2189
STYLUS 300 INKJET.....\$239	
STYLUS 800 INKJET less rebate.....\$255	
ACTION 1000/1500.....\$579/\$639	
SCANNER 600/800.....\$759/\$999	

ActionNote 486SLC/50

120mg HD, 4mg RAM, FAX modem, trackball, DOS, Windows, 1 yr. on-site warranty...\$1489

KENOSHA COMPUTER CENTER

SALES LINE OUTSIDE WISCONSIN
1-800-255-2989

Shipping/customer service/technical assistance, call
414-697-9595 • FAX 414-697-0620



HEWLETT PACKARD

LASERJET IV/IVM.....\$1369/\$1929
LASERJET IVP/IVPM.....\$989/\$1379
LASERJET IVL/IVML.....\$675/\$1039
LASERJET IVSI/IVSIMX.....\$2989/\$4499
JET DIRECT.....\$399
2MG/4MG/8MG UPGRADE.....CALL
HP IIP/IICX SCANNER.....\$719/\$979
DESKJET 520/560C.....\$299/\$569
DESKJET 550C.....\$479
DESKJET 1200C or 1200C/PS.....CALL

OKIDATA

ML320/ML321.....\$296/\$415
ML520/ML521.....\$369/\$489
ML590/ML591.....\$415/\$569
ML380/ML395.....\$209/\$359
ML395C.....\$1029
PM3410.....\$1199
OL400E/OL410E 600DPI.....\$496/\$659
OL810/OL830.....\$899/\$1089
OL850+.....\$1189
OKIDATA 400E 2MG.....\$129

Panasonic

Office Automation

2023/11241.....\$199/\$229
2180/2123.....\$159/\$229
2124/2624.....\$295/\$399

Canon

"BubbleJet" Printers

BJ 10SX.....\$239
BJ 200E.....\$285
BJ 230.....\$389
BJC 600.....\$569

Laser Printers

LBP 430.....\$579
LBP 860.....\$1329
600 DPI, 8PPM

Innova NX M25-120

486SX-25 Notebook.....\$1489
4mg RAM, FAX Modem, 120mg HD,
DOS, Windows, built-in trackball
Also: DUAL SCAN COLOR...\$1999

NEW!



BJC 600

Full 4 Color Process
for a Multitude of
Colors!

360 DPI, 240cps,
100 sheet auto feed,
Canon, Epson and
IBM emulation
plus 2-year warranty.

NOTEJET 486 SLC/25

Built-in Bubblejet printer, 4mg RAM,
2 PCMCIA slots, DOS, Windows
135MG...\$2349 180MG...\$2549
Also: DUAL SCAN COLOR...\$2749

MODEMS & FAX MODEMS

PRACTICAL PERIPHERALS

PRACTICAL PER 14.4 POCKET.....\$269
PRACTICAL PER 14.4 PCMCIA.....\$265
PRACTICAL PER 14.4 INT/EXT.....\$149/\$159

HAYES

HAYES 14.4 POCKET.....\$299
HAYES 14.4 PCMCIA.....\$289
HAYES OPTIMA 14.4 W/FAX.....\$349
HAYES ACCURA 14.4 W/FAX.....\$149

U.S. ROBOTICS

Sportster 14.4 Int.....\$145
Sportster 14.4 Int. with FAX.....\$149
Sportster 14.4 Ext.....\$159
Sportster 14.4 Ext. with FAX.....\$169
V.32 TERBO FAX.....\$345
World Pro 14.4 PCMCIA.....\$279

Intel Satisfaction Below

intel OVERDRIVE

PROCESSOR UPGRADES

- For any Intel 486 based system
- Improves system performance up to 70%
- Accelerates all DOS, Windows, OS/2 and Unix applications
- Cost effective upgrade to next generation CPU technology

Overdrive Upgrade SX20/25.....\$279/\$279
Overdrive Upgrade DX25/33.....\$295/\$389

MEMORY PRODUCTS

2MB IBM 30-286.....\$139
2MB IBM PS1 386.....\$129
4MB IBM THINKPAD 700, 700C.....\$229
4MB TOSHIBA 2000, 2200, 1850C.....\$265
1&4 MB SIMMS.....CALL
2 MB FOR PANASONIC 4410.....\$125
2 MB FOR OKI 400.....\$125
2 MB FOR EPSON ALII.....\$139
2 MB FOR H-P IIP, IIP & III.....\$109
BOCA RAM OK FOR AT OR PSII.....\$99

CALL FOR ALL OTHER MODELS & MFG

CO-PROCESSORS & DOUBLERS

80287 XL/XLT.....\$75
80387 SL.....\$75
80387 SX.....\$75
80387 DX.....\$85

CYRIX

CX486DRX2-16/32.....\$249
CX486DRX2-20/40.....\$279
CX486DRX2-25/50.....\$329
CX486SRX2-16/32.....\$249
CX486SRX2-20/40.....\$279

BATTERY BACKUPS AMERICAN

250/400.....\$99/\$155
450/600.....\$185/\$259
900/1250.....\$389/\$485
SMART UPS 400/600.....\$279/\$335
SMART UPS 900/1250.....\$529/\$679
SURGEARREST + W/TEL.....\$55

HARD DRIVES & TAPES

SEAGATE & MICROSOLUTIONS

SEAGATE 120 MB 3145A.....\$189
SEAGATE 260 MB 3290A.....\$225
SEAGATE 452 MB 3550A.....\$379
SEAGATE 1 GB SCSI 11200N.....\$939
BACKPACK 170/250 MB.....\$375/\$459
BACKPACK 250 MB EXT. TAPE.....\$349



TAPE BACK UP

COLORADO TRAKKER 250.....\$315
COLORADO TRAKKER 120.....\$275
COLORADO JUMBO 250.....\$159
COLORADO JUMBO 120.....\$119
COLORADO 2 GB EXT.....\$1089
COLORADO 4 GB EXT.....\$1639
QIC 80 TAPES.....\$20

SOFTWARE

ALDUS Pagemaker.....\$519
COREL DRAW ON CD.....\$279
LOTUS 123 VER 2.4/3.4.....\$279/\$325
MICROSOFT EXCEL/WINDOWS.....\$289
MICROSOFT WORD/WINDOWS.....\$299
NORTON UTILITIES 7.0.....\$89
PARADOX 4.5 WINDOWS.....\$139
PC ANYWHERE HOST REMOTE.....\$89
WORD PERFECT WINDOWS 6.0.....\$269

ALL OTHER TITLES.....CALL

TEXAS INSTRUMENTS

486 WIN5X 120.....\$1835
486 4000E SX/25 120MB Color.....\$2099
486 DX2/40 200 MB Color.....\$2889
486 DX2/50 Mono.....\$2639
486 4000E DX2/50.....\$3749
200MB ACTIVE COLOR.....\$3749

CALL FOR ALL OPTIONS

MONITORS

Mitsubishi Diamond Scan 15F8.....\$479
Mitsubishi Diamond Pro 17".....\$999
Mitsubishi HL 6955 20".....\$1759
Mitsubishi Diamond Pro 21F8.....\$2149
NEC 3FGE/3V.....\$549/\$459
NEC 4FGE.....\$599
NEC 5FGE/5FQP.....\$999/\$1089
NEC 6FQP.....\$1959
Nanso 340 IW/F550 I.....\$659/\$995
Nanso T580 I/F550IW.....\$1849/\$1089
Nanso F560IW/T760IW.....\$1329/\$2029
Viewsonic 15.....\$425
Viewsonic 17/17G.....\$949/\$799
Viewsonic 20.....\$1529
Viewsonic 21.....\$1789
CTX 5488A/1451.....\$249/\$279
CTX 1560/1760.....\$379/\$659

GRAPHICS CARDS

ATI GRAPHICS ULTRA+ 2MB.....\$229
ATI GRAPHICS ULTRA PRO 2MB.....\$329
DIAMOND Speedstar PRO 1 MB.....\$129
DIAMOND STEALTH VLB 1MB.....\$159
DIAMOND VIPER 2MB.....\$389
HERCULES GRAPHITE 2MB.....\$369
ORCHID FAHRENHEIT 1280 1 MB \$155
ORCHID FAHRENHEIT VA 1MB.....\$179

No charge for MasterCard or Visa. We ship COD on a cash or cashier's check basis only. Shipping & handling 3% (\$8 minimum, \$10 minimum on printers); AK and HI slightly higher. Returned items may be subject to restocking fee. Purchase orders accepted from Fortune 1000, Government institutions, schools and universities.

Prices and availability subject to change.

KENOSHA COMPUTER CENTER
2133 91st Street
Kenosha, Wisconsin 53143

KENOSHA COMPUTER CENTER

1-800-255-2989

CIRCLE 242 ON READER SERVICE CARD

Mon.-Fri. 8am-7pm • Sat. 9am-3pm

CompuServe Highway



**CompuServe would like to introduce you
to our information highway.
Complete with visitor centers, shopping malls,
town squares, and other world travelers.**

You've probably been hearing a lot about the information highway lately. But before you take your next trip, maybe you should make sure the highway you're on is a superhighway. Like CompuServe.

CompuServe has nearly 2,000 places for you to go, things for you to see, and fun for you to have. You can turn in to one of our many forums where nearly every hardware and software vendor is represented, along with almost every shade of political opinion. Our Electronic Mall[®] is filled with the newest merchandise, and our CB Simulator and Electronic Convention Center let you just stop by and chat.

Other services range from renowned reference databases to timely financial data and thousands of freeware and shareware programs.

Plus, CompuServe has over a million and a half

members worldwide. So, you're bound to find plenty who will share your interests, be able to offer advice, or just become fast friends.

For only \$8.95 a month, you can get unlimited connect time — day or night — to a full package of more than 50 basic services. That includes news, stock quotes, travel arrangements, movie and restaurant reviews, 60 E-mail messages a month, and more. Plus, a whole universe of other services is available at nominal additional charges.

So, get on the fast track. For more information or to order, see your computer dealer or call 1 800 848-8199. And take our information highway straight into the next century.



CompuServe[®]

The information service you won't outgrow.[™]

MAIN STREET COMPUTER COMPANY'S

NETWORK EXPRESS

CONNECT WITH US

NOVELL SOFTWARE



NetWare V3.12 5 User \$629

Novell 3.12 5/10 User..... 629/1,399
Novell 3.12 25/50 User..... 1,895/2,499
Novell 3.12 100/250 User..... 3,649/4,999

NetWare V4.01 5 User \$879

Novell 4.01 5/10 User..... 879/1,999
Novell 4.01 25/50 User..... 2,995/3,799
Novell 4.01 100/250 User..... 5,399/6,999
Novell 4.01 500/1000 User..... 16,834/20,609
Novell Encyclopaedia..... 495
Novell NFS/386 NLM..... 3,499
Novell Personal NetWare 1/5 User..... 75/239
LAN Workgroup for DOS..... 319
Upgrade Your Existing Novell to a Newer Version or Add Users & Save! Call For Details.

STARTER KITS



2-Station Personal NetWare Starter Kit \$349

2- Novell Personal NetWare
2- 16 Bit NE Combo Adapters
1- Cable Crimping Tool
2- 52 Ohm Terminators
2- 52 Ohm Terminators

5 Station Starter Kit \$1,249

1- Novell NetWare 5 User
1- 16 Bit NE Combo Adapters
1- Cable Crimping Tool
2- 52 Ohm Terminators
2- 52 Ohm Terminators
1- 500' Spool RG58A/U Thin Coax

5 to 10 Station 10 BaseT Starter Kit \$2,495

1- Novell 3.12 10 User Software
5- NE 10 BaseT Adapters
1- TTC 12 Port 10 BaseT Wiring Hub
1- 1000' Spool 8 Conductor TP Wiring
1- RJ45 Crimping Tool 20 - RJ45 Connectors

4 Station 10BaseT Starter Kit \$849

4- Personal NetWare or Artisoft A.S.O
4- 16 Bit NE Combo Adapters
1- 4 Port External Hub
1- 250' Spool 8 Conductor TP Wiring
1- RJ45 Crimping Tool 10 - RJ45 Connectors

TAPE DRIVES

Colorado Dv 10 D3 20 120/250MB Int 159/1199
Colorado Powerstage 2GB/4 GB Int 1,099/1,899
Colorado Powerstage 2GB/4 GB Ext 1,279/1,899
Conner 2GB/4GB Internal..... 1,229/1,639
Conner TurboPylon 4GB DAT Int/Ext 399/1,599

WIDE - AREA NETWORKING

Retix 2265 Local Ethernet Bridge \$1,399

BRIDGES/ROUTERS

D-Link 1100 Local Bridge..... 1,579
D-Link 1140 Remote Bridge..... 2,949
D-Link 1120 Remote Bridge..... 1,559
Devcon 120x 2 port Local Bridge..... 1,495
Devcon 120x 2 port Local Bridge..... 3,189
Intelcom Quicknet..... 2,949
Intelcom Quicknet 6000 Bridge..... 2,949
Intelcom Quicknet..... 2,949
Novell Multiprotocol Router..... 729
Retix 3680 Local Token Ring Bridge..... 4,899
Retix 3680 Remote Token Ring Bridge..... 5,399
Retix 4760 Local Ethernet Router..... 2,249

CSU/DSU

Astracom 2340 Variable Speed CSU/DSU..... 649
Astracom NX11 11 CSU/DSU..... 1,495
Pentel 58K CSU/DSU..... 359
Pentel 96K CSU/DSU..... 475
Pentel 11 CSU/DSU..... 1,579

FREE NETWORK@ INSTALLATION as a special service to purchasers of Novell NetWare®. We are pleased to offer proper installation of your software by our Certified Network Engineers (CNE). Just purchase a site license and Network@ from us, and we'll do the rest GETTING WHAT YOU WANT! The above configurations are examples of outstanding value available when the advertisement was constructed. It is very likely that your requirements will differ. Items that represent the best value may have also changed. Please call us for a price on your requirements. Get exactly what you want at the same low pricing level.

NOVELL COMPATIBLE LAN EQUIPMENT

\$389 300 210MHz 40MHz

- 1MB RAM
- 16 Bit Ethernet Adapter
- 210 MB HD
- Choice of 1.2 or 1.44MB FDD
- 28MM SVGA Color Monitor
- 1MB SVGA Adapter

\$1199 400 333MHz 210MHz SVGA

- 4MB Ram
- 16 Bit Ethernet Adapter
- 210 MB HD
- Choice of 1.2 or 1.44MB FDD
- 28MM SVGA Color Monitor

\$1499 400 333MHz LOCAL BUS

- 4MB Ram
- 16 Bit Ethernet Adapter
- 250 MB HD-VL-BUS
- Choice of 1.2 or 1.44MB FDD
- 28MM SVGA Color Monitor
- VL-BUS 1MB VGA Adapter

\$2079 400 333MHz LOCAL BUS

- 8MB Ram
- 16 Bit Ethernet Adapter
- 420 MB HD-VL-BUS
- Choice of 1.2 or 1.44MB FDD
- 28MM SVGA Color Monitor
- VL-BUS 1MB VGA Adapter



WE'RE YOUR NETWORKING SOURCE

WORKSTATIONS & FILE SERVERS

\$1299 486DX 33MHz

- 4MB RAM
- 64K RAM Cache
- 16 Bit Ethernet Adapter
- 340 MB HD
- Choice of 1.2 or 1.44MB FDD
- Monochrome VGA Monitor

\$1995 400 DX2 66MHz VL-LOCAL BUS

- 8MB RAM
- 256K RAM Cache
- 16 Bit Ethernet Adapter
- 520 MB HD
- Choice of 1.2 or 1.44MB FDD
- Monochrome VGA Monitor
- IDE VL-BUS Adapter

\$3899 400 EISA 50MHz

- 16MB RAM
- 256K Cache
- EISA SCSI Adapter
- 1.0 GB SCSI HD
- Both 1.2 & 1.44MB FDD
- Monochrome VGA Monitor
- VGA Video Adapter
- 300 Watt Power Supply
- Novell Compatible

\$4789 Pentium File Server

- 16MB RAM
- 256K RAM Cache
- 16 Bit Ethernet Adapter
- 1.6 GB HD
- 1.44MB FDD
- Monochrome VGA Monitor

10 BASE T PRODUCTS



16 + 2 PORT 10 BaseT HUB \$499

- 16 - 10 BaseT Ports
- 1 - AUX Port
- 28 - LINK/LED's
- EIE 802.3 Ethernet Compliant Repeater

8 PORT \$229

10 BaseT Cable Assemblies

- 10 BaseT Cat5e 100'..... 1.19
- 10 BaseT Cat5e 200'..... 1.19
- 10 BaseT Cat5e 300'..... 1.19
- 10 BaseT Cat5e 400'..... 1.19
- 10 BaseT Cat5e 500'..... 1.19
- 10 BaseT Cat5e 600'..... 1.19
- 10 BaseT Cat5e 700'..... 1.19
- 10 BaseT Cat5e 800'..... 1.19
- 10 BaseT Cat5e 900'..... 1.19
- 10 BaseT Cat5e 1000'..... 1.19

REPEATERS

TUT SYSTEMS 2 PORT REPEATER \$299

30cm Linkunder 10 Port Repeater..... 1,619
30cm 6 Port Fiber Optic Repeater..... 1,659
Canary BNC / FDD Repeater..... 599
IMC PoNet Basket PLUS..... 649
TUT Systems 2 Port Repeater..... 299
TUT Systems 4 Port Repeater..... 499
TUT Systems 8 Port Repeater..... 829

TRANSCEIVERS

AUI to BNC or AUI to RJ45 \$69

AUI to BNC Transceiver..... 69
AUI to 10 BaseT Transceiver..... 69
Canary BNC / FDD Transceiver..... 599
IMC Fiber Optic Transceiver..... 219

TEST EQUIPMENT

MT350 Value Kit \$1,979

Advanced Certification for UTP, STP and Coax Supports Ethernet, Token Ring & ARCNET

Acutek 10BT Continuity + Polarity Tester 129
Cable Continuity Tester BNC..... 39
Fluke Lan Test Equipment..... CALL
MicroTest Quick Scanner Kit..... 629
MicroTest Ring Cable Test Kit..... 995
Novell Lanalyzer for Windows..... 995
Time Domain Reflectometer..... 579

PRINT SERVERS

Network Express Printmate 3 \$399

- 2 Parallel Ports
- BNC/AUI & RJ45 Connections
- Simple Installation
- 2 Year Warranty

NETWORK EXPRESS

AD CODE E44X

1-800-753-9899

24 HOUR TOLL FREE FAX 1-800-333-5841

VOICE 1-812-355-2878 FAX 1-812-355-5841

POWER BACKUP



Smart UPS 600 \$389

File-Server Backup
Retail \$599

AMERICAN POWER 120 VOLT

BackUPS 250/400/450..... 109/179/209
BackUPS 600/900/1250..... 299/419/549
SmartUPS 250/400/600/900/259/329/389/559
SmartUPS 1250/2000..... 749/1,249
Matrix 3000/5000 VA UPS..... 2,895/4,349
Powerchute for NetWare..... 79
Powerchute for Windows..... 49
Interface for Lantastic + Lan Manager..... 39
Surge Arrest PLUS..... 79
7 Outlet 35 with Tel 59

AMERICAN POWER 120 VOLT

BackUPS 250/400/600..... 189/229/299
BackUPS 600/1250..... 489/629
SmartUPS 250/600/900..... 279/429/559
SmartUPS 1250/2000..... 879/1,379

TRIPLITE 120 VOLT

BC 250/400/500..... 109/169/199
BC 500 LAV/600 LAN..... 229/269
BC 750 LAV/1250 LAN..... 329/439
Isobar Ultra 4/6/8..... 49/59/69
LS600/1200/1800..... 79/149/209
Power Miser 4 Outlet..... 49

Equipment Warranted up to \$25,000. by Manufacturers - Details Available.

SCSI HARD DRIVES

1 Gigabyte SCSI Hard Drive \$1,099

Fujitsu M2694 ESA

5 Year Manufacturer Warranty

M2624FA..... 1.0GB..... 1.099
M2266SA..... 1.1GB..... 1.295
MTX 1240S..... 1.24GB..... 1,349

ETHERNET COAX



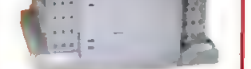
Ethercard Elite 16C Ultra \$119

QTY 6+ \$109

ADAPTERS

300M 3C507 Etherlink 16 BNC ea/5+319/719
300M 3C503 Etherlink 16 BNC ea/5+ 179/719
300M 3C509 Etherlink III ea/5+ 129/719
300M 3C579 EISA 32 Bit..... 259
Artisoft NetAdapter II SCSI BNC ea/6+ 109/99
Atta BNC-RJ45 16 Bit & LED..... 349
Eagle/Arctnet NetAdapter II BNC ea/5+ 115/99
IBM Ethernet BNC Adapter..... CALL
Intel Ether Express 16 BNC..... 115
Kodak Netport BNC - 10BT..... 269
NE 2000 Compact Ethernet Controller..... 79
NE PC300B Pocket Ethernet BNC ea/3+ 199/169
SMC Ethercard + Elite 16 BNC ea/6+ 129/119
SMC Ethercard + Elite 16 City 6+..... 119
SMC Elite Coax Micro Channel..... 199
SMC EISA Dual Port BNC..... 679
Xircom Pocket Adapter BNC..... 299

MICROPOLIS



RAIDION LT \$4,339

Micropolis Raidion LT 1120 RAID ARRAYS

Micropolis Raidion LT 2100..... 4,975
Micropolis 6040..... 13,412

MICRODISK

Super Capacity External Storage

Microdisk 670 667MB 15ms..... 1,499
Microdisk 1030 1034MB 14.5ms..... 1,699
Microdisk 1340 1341MB 14.5ms..... 1,750
Microdisk 1750 1748MB 14ms..... 2,350
Microdisk 2100 2100MB 11.5ms..... 2,550
Microdisk 3020 3022MB 12ms..... 2,550
Microdisk PC Kit..... 75
Microdisk Mac Kit..... 90

ARCNET PRODUCTS

Arctnet Adapter 8 Bit Star/BUS \$59

Active Hub 8 Port..... 139
Arctnet Adapter 16 Bit Star/BUS..... 79
BNC Connector RG62..... 3
CNET 4 Port Passive Hub..... 29
D Link Pocket Arcnet..... 189
SMC PC130 8 Bit..... 249
SMC 4 Port TP Repeater..... 249
RG62A/U Cable..... 301
Thomas Conrad 100 Mbps ISA Adapter..... 499
Xircom Pocket Arcnet Adapter II..... 269

Network Express Policies...

- 30 Day Satisfaction Guaranteed Evaluation Period. Item, but not refund can be made after 30 days from date of purchase.
- Products must be in new condition with all original boxes and received materials. Opened products are not returnable.
- Full Manufacturer's Warranty on all products.
- Same Day Shipping & Overnight Delivery available on most orders.
- Software Education 3rd Corporate Purchase Orders subject to approval.
- APPROPRIATE Welcome - Shipping Charges Not Refundable - We Sear!
- Prices, Specifications & Availability subject to change without notice.



\$349 IT'S YOUR CHOICE!

Arctnet Adapter 8 Bit Star/BUS \$59

High Performance 2 Station Starter Kit
With Your Choice of Software

NETWORKING BREAKTHROUGH! COMPLETE 2 STATION (GIGABIT ETHERNET) STARTER KIT INCLUDES:

- 2 Coax 4-4mm adapters for personal NetWare
- 2 16 Bit Ethernet Adapters
- 2 100M Network Cards
- 2 100M Network Cables
- 2 100M Network Hubs
- 2 100M Network Switches
- 2 100M Network Routers
- 2 100M Network Bridges
- 2 100M Network Gateways
- 2 100M Network Firewalls
- 2 100M Network Intrusion Detection Systems
- 2 100M Network Antivirus Software
- 2 100M Network Backup Software
- 2 100M Network Monitoring Software
- 2 100M Network Logging Software
- 2 100M Network Alerting Software
- 2 100M Network Configuration Software
- 2 100M Network Troubleshooting Software
- 2 100M Network Performance Software
- 2 100M Network Security Software
- 2 100M Network Encryption Software
- 2 100M Network Compression Software
- 2 100M Network Archiving Software
- 2 100M Network Backup Software
- 2 100M Network Recovery Software
- 2 100M Network Restoration Software
- 2 100M Network Migration Software
- 2 100M Network Cloning Software
- 2 100M Network Imaging Software
- 2 100M Network Wiping Software
- 2 100M Network Formatting Software
- 2 100M Network Partitioning Software
- 2 100M Network Defragmentation Software
- 2 100M Network Optimization Software
- 2 100M Network Tuning Software
- 2 100M Network Benchmarking Software
- 2 100M Network Stress Testing Software
- 2 100M Network Load Testing Software
- 2 100M Network Performance Testing Software
- 2 100M Network Security Testing Software
- 2 100M Network Vulnerability Assessment Software
- 2 100M Network Penetration Testing Software
- 2 100M Network Incident Response Software
- 2 100M Network Forensic Analysis Software
- 2 100M Network Digital Forensics Software
- 2 100M Network Computer Forensics Software
- 2 100M Network Mobile Device Forensics Software
- 2 100M Network Cloud Forensics Software
- 2 100M Network IoT Forensics Software
- 2 100M Network Blockchain Forensics Software
- 2 100M Network Cryptocurrency Forensics Software
- 2 100M Network Smart Contract Forensics Software
- 2 100M Network NFT Forensics Software
- 2 100M Network DAO Forensics Software
- 2 100M Network DeFi Forensics Software
- 2 100M Network Web3 Forensics Software
- 2 100M Network Metaverse Forensics Software
- 2 100M Network VR Forensics Software
- 2 100M Network AR Forensics Software
- 2 100M Network MR Forensics Software
- 2 100M Network XR Forensics Software
- 2 100M Network Extended Reality Forensics Software
- 2 100M Network Immersive Reality Forensics Software
- 2 100M Network Virtual Reality Forensics Software
- 2 100M Network Augmented Reality Forensics Software
- 2 100M Network Mixed Reality Forensics Software
- 2 100M Network Holographic Reality Forensics Software
- 2 100M Network Telepresence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics Software
- 2 100M Network Holographic Immersion Forensics Software
- 2 100M Network Tele-presence Forensics Software
- 2 100M Network Remote Presence Forensics Software
- 2 100M Network Virtual Presence Forensics Software
- 2 100M Network Immersive Presence Forensics Software
- 2 100M Network Holographic Presence Forensics Software
- 2 100M Network Tele-immersion Forensics Software
- 2 100M Network Remote Immersion Forensics Software
- 2 100M Network Virtual Immersion Forensics Software
- 2 100M Network Immersive Immersion Forensics

WE WILL TRY TO MATCH OR BEAT ANY ADVERTISED PRICE. CALL FOR LATEST PRICING!!

WE ACCEPT PO'S
FROM QUALIFIED FIRMS

M E M O R

NO SURCHARGE
FOR MC, VISA AE & DISCOVER

CACHE MEMORY

	128K	192K	256K	320K
80C8	-	8.50	8.00	5.50
320K8	-	9.00	8.00	5.50
640K8	-	11.00	8.00	5.50
640K8	-	11.00	8.00	5.50
128K8	-	8.00	7.00	5.00
128K8	-	-	38.00	29.00

Individual D-RAM Chips

MEMORY FOR IBM & APPLE				
4096 68000 70000 68000 10000				
1Megx1	7.35	7.25	6.75	5.95
1Megx4	36.00	25.00	27.00	-
1Megx4 (20 Pin)	27.00	25.00	23.00	-
236 x 4 (Videx Zip)	15.95	11.95	10.95	-
256x4	8.95	7.95	6.95	-
256 x1	4.00	3.50	3.00	2.75
256 x16VDRAM	-	39.00	39.00	-
64x4	-	-	3.25	-
64x1	-	2.00	-	-

INTEL Math Chips

8087	45.00
8087-2	49.00
8087-1	46.00
80387-3L	58.00
80387-16 DX	48.00
80387-40 DX	55.00
80387-40 (Does All)	78.00
80487-SX (Does All)	309.00
Intel SX (Does All)	79.00
Intel SL Model	88.00
Intel 185X	49.00
Intel 205X	54.00

AMBRA

Ambra Pentium-40	4/16 Meg	175.00/338.00/688.00
Ambra 564500	4/16 Meg	CALL
Ambra Sprint 386, Hurdle 386SX	2/4 Meg	CALL
Enterprise 386 Sim	-	-
Ambra Sprint, Hurdle & Enterprise 486	4/16 Meg	CALL
Ambra NC 425L	2/4 Meg	108.00/209.00/448.00
Ambra N Series	4/8/12/16 Meg	108.00/209.00/448.00
Ambra S Series	4/16 Meg	189.00/329.00

CYRIX DRx 386 to 486 Upgrade

Clock Doubler

* Single chip upgrade solution	CX486 DRx/16/32	259.00
* Clock doubling technology	CX486 DRx/20/40	299.00
* Compatible with Intel Pentium 386SX CPU model	CX486 DRx/25/50	309.00
* Compatible with IBM, Windows, OS/2, MS-DOS 1.1 and 2.1	CX486 DRx/33/66	309.00
* Easy to install—no BIOS updates	CX486 SRx/16/32	249.00
The Cyrix upgrade runs at twice the speed of your original 386 microprocessor combined with a 1K on-chip cache you will enjoy a performance boost of 100% and more. Ideal for any DOS, Windows or OS/2 application which requires a large amount of microprocessor horsepower	CX486 SRx/20/40	249.00
	CX486 SRx/25/50	279.00

SIMM MODULES (Add \$5.00 for SVP)

	4096	8096	16384	32768	65536	131072
1Meg x 3 (3 chip)	55.00	55.00	42.00	41.00	40.00	-
1Meg x 3 (8 chip)	60.00	60.00	48.00	47.00	46.00	38.00
4Meg x 3	-	-	185.00	158.00	148.00	-
16Meg x 3 (9 chip)	-	-	-	-	798.00	-

72 PIN SIMMS (EISA)

256 x 32 1Meg	-	-	-	88.00	58.00	-
512 x 32 2Meg	-	-	-	84.00	-	-
1 x 36 4Meg	-	-	190.00	190.00	175.00	-
2 x 36 8Meg	-	-	350.00	388.00	408.00	-
4 x 36 16Meg	-	-	688.00	648.00	648.00	-
8 x 36 32Meg	-	-	1548.00	1488.00	-	-
16 x 36 64Meg	-	-	-	CALL	3516.00	-

CYRIX FASMATH PROCESSOR

Programs executed up to 3X faster. Plug & object code compat. w/Intel
80387-335X - \$8.95 80387-338X - \$9.95 83887-265X Ver. - \$6.95
80387-335X - \$8.95 PC Week's rated #1 over all math chips
5 Year Warranty - "All Demand Compatible"

WARMY MEMORY

MODEL	4096	8096	16384	32768	65536	131072	262144	524288	1048576
8087	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
80387	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
80487	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
80587	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
80687	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
80787	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
80887	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
80987	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
81087	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
81187	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
81287	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
81387	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
81487	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
81587	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
81687	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
81787	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
81887	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
81987	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
82087	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
82187	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
82287	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
82387	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
82487	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
82587	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
82687	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
82787	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
82887	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
82987	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
83087	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
83187	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
83287	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
83387	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
83487	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
83587	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
83687	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
83787	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
83887	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
83987	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
84087	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
84187	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
84287	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
84387	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
84487	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
84587	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
84687	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
84787	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
84887	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
84987	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
85087	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
85187	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
85287	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
85387	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
85487	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
85587	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
85687	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
85787	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
85887	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
85987	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
86087	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
86187	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
86287	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
86387	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
86487	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
86587	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
86687	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
86787	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
86887	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
86987	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
87087	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
87187	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
87287	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
87387	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
87487	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
87587	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
87687	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
87787	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
87887	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
87987	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
88087	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.00
88187	45.00	49.00	46.00	58.00	48.00	46.00	55.00	78.00	88.0

BULLDOG COMPUTER PRODUCTS RECEIVED PC COMPUTING'S ★★★★ MAIL ORDER AWARD!!! CALL 1-800-438-6039



Canon NOTEJET 486 - SLC/25

- 486 SLC/25 Mhz
- Built-in "Bubble-Jet" printer
- 135 MG - \$2349 • 180 MG - \$2549
- Dual Scan Color!
- 120 MG - \$2749 • 200 MG - \$3099



Epson Stylus 800—\$255*



*After Rebate!

Network

3COM	
3C503-18/5-pack	155/719
3C503TP 10 Base T	219
3C507 Ethernet 16	279
3C579 Ethernet EISA	229
3C509-Etherlink 3	115
3C509-5 Pack	519

ARTISOFT	
Starter Kit 2mbps/AE2	325/429
Lan Cards 2mbps/AE2	129/179
Central Station	385
Noderunner S1 2000	85
2000/C Starter Kit	409
2000/C add on Kit	169

CALL FOR OTHER LANTASTIC PRICES!

INTEL	
Ether Express 16/16TP	89
Ether 16-5 Pack	429
Ether 16-20 Pack	1629
Ether Flash	89
Ether Flash 5 Pack	479
Ether Combo/5 Pack	115/539
Token Express 16/4	389
Netport 2	359

NOVELL	
NE2000/5 Pack	89/349
NE3200	659
Novell Lite 1.1/starter kit	69/409
Netware 2.2 5/10 User	479/1059
Netware 3.12 5/10 User	579/1299
Netware 3.12-25 User	1899
Netware 3.12-50 User	2349
Netware 3.12-100 User	3349
Netware 4.0-5/10 User	859/1959
Netware 4.0-25 User	2899
Netware 4.0-50 User	3899

SMC	
PC130/PC130E	75/99
PC600WS/PC600FS	129/199
Ethercard 8 bit/16 bit	89/119
10 Base-T Card 8 bit/16 bit	99/119
3608TP 10BT concentrator	325
3512TP Ether 10BT conc. 12 port	579

KINGCOM	
Pocket Ethernet PE3-10B	249
Pocket Ethernet PE3-10BT	259
Parallel Port Multiplexor	79

Software

Aldus Pagemaker 5.0	509
Carbon Copy/Close Up	129/119
Clarion ProDeveloper	299
Clipper 5.2	479
Corel Draw 4.0	359
Dbase IV V 2.0	409
FoxPro 2.5	299
Framemaker	549
Freelance Plus 4.0	299
Harvard Graphics	359
Lotus 2 4/3 4	275/325
Lotus for Windows 4.0	279
Smart Suite Bundle	399
MS DOS 6.0	In Stock
Microsoft Windows 3.1	79
Microsoft Windows N/T	309
Microsoft Windows for Workgroup	139
Microsoft Access 1.0 for Windows	299
Microsoft Excel 4.0 for Windows	299
Microsoft Bookshelf - CD	129
Microsoft Office	449
Microsoft Word for Windows 6.0	289
Norton Utilities 7.0	105
Peachtree III Complete DQ	179
Paradox v4.0	519
Q&A 4.0	179
Ventura Desktop Pub	Best Price!
Winfax Pro	79
Word Perfect 6.0	249
Word Perfect for Windows	268
Word Perfect 6.0 Upgrade	99

Notebooks

CANON	
486 SLC/25, 120 mg	1489
486 SLC/25, 120 mg-color	2199
Notejet 486 w/printer-85mg	2139
Notejet 486 w/printer-135 mg	2349
Notejet 486 w/printer-180 mg	2549
Notejet 486-Color-120 mg	2749
EPSON	
486 SLC50/120 mg	1489
TEXAS INSTRUMENTS	
4000 SX25 W/120	1835
4000 DX2/50 W/200	2639
4000 DX2/40 Color W/200	2889
4000 DX2/50E Active Color	3749

Monitors

NEC MULTISYNC	
3FGE/3V	549/459
4FGE	599
5FGE	969
5FGP	1089
6FGP	1959
CTX	
1561 15" SVGA	349
5468/1451	249/269
1760 17" SVGA	659
MAG	
MX15F 15" 28	495
MX17F 17" 28	879
NANAO	
F760W	1999
F550/F550W	995/1089
F560W/T560	1339/1649
F340W	659
VIEW SONIC	
15/17G	429/799
17	949
20/21	1529/1789

Modems & Fax

BOCA	
14 4 Fax Modem Int/Ext	129/149
CARDINAL	
2400 Int/Ext	42/65
14 4 Int/Ext	169/179
HAYES	
Optima 96	319
Optima 14 4 Ext/Fax	349
PCMCIA 14 4	289
Pocket 14 4	299
Hayes 28.8	409
Accura 14 4 Fax Int/Ext	149/159
Accura 2400B Int/Ext	59/75
INTEL	
14.4/14.4 Fax Int/Ext	135/155
PC MCIA 24/96	149
PC MCIA 14 4/14 4	259
Satisfaction 300 14 4/9600 Fax	219
Satisfaction 400/400E	259/295



PRACTICAL PERIPHERALS	
PP 14400 Fax Int.	149
PM 14400 FXMT ext v.32 bis	159
PM 14400 FXPPM Pocket Mod.	269
PCMCIA	265
US ROBOTICS	
Sportster 14.4 Int.	145
Sportster 14.4 Fax/Int	149
Sportster 14.4 Fax/Ext	169
Terbo HST Dual Std.	659
V.32 Terbo Fax Int.	345
PCMCIA 14 4	239

Printers

CANON	
BJ10sx	239
BJ200E	285
BJ230	389
BJC600	569
LBP-430	579
LBP-860-600 dpi	1329
EPSON	
LX810	169
AP 2250	119
AP 3250	169
FX870	259
FX1170	345
LQ570	235
LQ870	425
LO1070	355
LO1170	589
LQ2550	879
DFX5000	1299
DFX8000	2189
Action Laser 1000	579
Action Laser 1500	639
Stylus 300 Inkjet	239
Stylus 800 - After Rebate	255

HEWLETT-PACKARD	
Laserjet IV w/toner	1369
Laserjet IVM w/toner	1929
Laserjet IVL	675
Laserjet IVP	989
Laserjet IVM	1379
HP IVsa	2989
Deskjet 500/550c	285/459
Deskjet 520/550c	299/569
HP Deskjet 1200c	1399
HP Deskjet 1200c/ps	2029

LASER ACCESSORIES	
Upgrade for HP I mb	79
Upgrade HP 2mb/4mb	99/159
Jet Direct 2371A	399
Pacific Data 25-N-I	239
Pacific Page PE/PEXL	259/699

OKIDATA	
ML184/380	229/209
ML320/321	295/415
ML520/521	369/489
ML590/591	419/569
395/395c	959/1029
Laser 400E/810	495/899
Laser 410E-600 DPI	659
830i/850	1089/1199
PM3410	1199

NEC	
Jetmate 1000	289
610/1097	569/1349

PANASONIC	
2023/2123	199/229
1624/1654	379/579
2124/1695	295/369
2124 24 pin wide	369
4410 laser/4430	535/639
4440/4455	999/1499

Scanners & Misc.

Canon 1x 4015 Scanner	1299
Epson Action Scanning	759
Microsoft Mouse w/Windows 3.1	139
Logitech 256 w/OmniPage	185
Logitech Color Scanner	399
HP Scanjet IIP w/interface	719
HP Scanjet IIC w/interface	979
Summasketch 12x12	255
AMERICAN POWER	
Back-ups 250/400/450	99/159/189
Back-ups 600/900	259/369

NO CHARGE
FOR
CREDIT CARDS!



BULLDOG COMPUTER PRODUCTS

Canon Systems

One Year On-Site Warranty!
486 SX-33 w/4 MB w/210 Mg 1199
486 DX-2-50 w/4 MB w/210 Mg 1499
486 DX-2-66 w/4 MB w/210 Mg 1699
Canon systems include dual floppies,
Super VGA Monitor, Graphics Accelerator,
Mouse, D.O.S., Windows, Works,
Vase Local Bus

Drives

CONNER	
212 mg/540 mg	239/649
IONEGA	
Transportable 150	559
Insider 150	459
Tape 250 mg insider	179
Tape 250 mg ext.	319
21MB Floptical Insider	349
MAXTOR	
7213A 210 IDE	199
7245A 245 IDE	235
7345A 345 IDE	279
SEAGATE	
ST3145A	179
ST3290A 260MG	225
ST3390A 341MG	279
ST1480A 420 IDE	339
ST3550A 452MG	379
3655N 535MG SCSI	549
FLOPPY DRIVES	
1 2MB/1.44 MB	59
Micro Solutions 1 2MB/1.44 MB	169
Teac Dual Floppy Drives	119

Tape Drives

CONNOR - 250	149
COLORADO MEMORY SYSTEMS	
DJ10 120 Meg Int Jumbo	119
DJ20 250 Meg Int Jumbo	159
Trakker 120	275
Trakker 250	315
2120 Formatted Tape	21
MICRO SOLUTIONS	
80/250 Backpack	339
CD-2x	389
Back Pack 200 MG Drive	429

CD Rom

NEC	
3Xe/3Xi	549/449
3XP/4X Pro	429/699
TEXEL	
3028-INT-DS	289
5028-EXT-DS	399
CHINON	
535 INT	305
535 EXT	389

Chips

1 mg/4 mg Simms	49/159
HP 4mg/8 mg	159/339
Cyrix DRX2-2040	279
Cyrix DRX2-2550	329
INTEL	
387 SX or DX	85
Overdrive SX20/25	279/279
Overdrive DX2-25/33	279/389

3241 E. Washington Rd.
Martinez, GA 30907
Open weekdays: 8:30 a.m. to 5:30 p.m.
Saturday: 9:00 a.m. to 5:00 p.m.
(706) 860-7364 - (706) 860-7356
Shipping (706) 228-6368

If you recently purchased one of these...



DO NOT READ THIS AD

(BECAUSE IF YOU DID...YOU PAID TOO MUCH FOR TOO LITTLE)

13
Million
Winmarks

66MHz
32MB
RAM



Windows
EXPERTS'
PICK

January 1994



TravelPro 5300

**Fully Upgradable • Fully Accessible
Fastest Performer of Any Notebook**

Choice of Upgradable Intel CPU's 486SX-25, 486DX-33, 486DX2-50 & 486DX2-66 including 3.3v; - Available in upgradable Active Matrix, Dual Scan Passive or Monochrome Displays - Local Bus Video - Fastest Performance of any Notebook for True Desktop Power. - Built-In Center Trackball - PCMCIA Type III - Upgradable CPU, RAM & Display - Over 3 hours of Battery Life - 5.9 lbs. Mono - 6.3 lbs. Color - Removable 120MB Hard Drive (200-540MB Avail.) - Optional Internal Fax/Modem - Optional Docking Station

Prices Starting At

5325 25MHz Active Matrix	\$2895
5325 25MHz Dual Scan Passive	\$1985
5325 25MHz Monochrome	\$1495

Included With
Every AMS
Notebook

MS DOS 6.2

Windows 3.11
Workgroup Ed
With Built-In
Networking

AC Adapter

NIMH Battery

Executive
Carrying Case

See Us At
COMDEX Spring
Booth # 218



3.3
volt
CPU

TravelPro 7000

**Ergonomics & Power Management
The Value Priced Notebook Leader**

Featuring Large Center Based 25mm Trackball With Palmrest for ease of use - Choice of Intel Low Voltage SX-25 or SL-25 CPU (SL-25 Operates at DX-33 speed) - Choice of Monochrome or Dual Scan Displays - Includes: PCMCIA Type III (Takes 2 Type II or 1 Type III Device) or Internal 9600/2400 Fax/Modem with Communication Software - Upgradable RAM - Removable Hard Drive (120-540mb) - Unique Removable Keyboard for easy access to Upgrades or International Keyboard Support. - all for hundreds less than comparable systems

Prices Starting At

7525 SL-25 MHz Monochrome	\$1495
7325 SX-25 MHz Dual Scan Passive	\$1895
7325 SX-25 MHz Monochrome	\$1375

Introducing... The SoundPro 486

- Built-In 16bit DSS (Digital Sound System). For Presentation Quality Sound!
- Local Bus Hard Drive and Video. For Incredible System Performance!
- Upgradable CPU, Hard Drive, RAM & Display. For Unlimited Expansion!
- Includes Windows Sound System Software & Performance Portable Speakers

Call now and listen to a demo!

The most
advanced computer
available
...period.



16 Bit Sound
Local Bus I/O
Local Bus Video
3.3 Volt System

**Corporate, Dealer
& Government
Pricing Available**



Intel Inside is a registered trademark of Intel Corp. MS Dos & MS Windows are registered trademarks of Microsoft Corp. Not responsible for errors in advertising. Call for details on 30 day money back guarantee. restrictions apply.



Hours of Operation: M-F 6:30 a.m. - 6:00 p.m. • Saturday 9:00 a.m. - 3:00 p.m. PST

1-800-868-8108

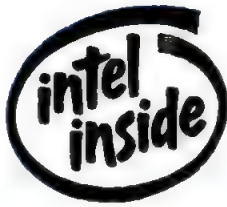
CIRCLE 235 ON READER SERVICE CARD

**Building High Performance
Notebook Systems Since 1985**

AMS

12881 Ramona Blvd. Irwindale, CA. 91766
Tel: (818) 614-8051 • Fax: (818) 614-0782

SIMPLY THE LOWEST PRICES.



PCI P60 CD shown
Monitor extra.

The Intel Inside and Pentium processor logos are trademarks of Intel Corporation.

PENTIUM!™ Computers

Insight PCI P60 Basic

Intel 60MHz PENTIUM™ Processor
New PCI interface Motherboard
273 Pin Zif Socket
2 PCI Slots
4 ISA Slots
1 PCI/ISA Slot
8MB RAM
256K Cache
1.44MB 3.5" Floppy Drive
1 Bi-directional Parallel Ports
2 Serial Ports
Enhanced 101 Key Keyboard
Mouse
MS-DOS 6.21
Windows for Workgroups 3.11
Desktop case standard,
tower case available

Monitor, hard drive and video optional.

60MHz-PCI Basic

\$1,799

Lease as low as
\$87/mo.

Insight VESA® Local Bus™ Computers

Insight SuperSaver 486

Fully Upgr. Intel 486
4MB RAM
210MB 12ms IDE Hard Drive
14" N.I. SVGA Color Monitor
1.44 MB 3.5" Floppy Drive
Local Bus Graphics w/512KB
2 Serial Ports, 1 Parallel Port
Enhanced 101 Key Kbd. - Mouse
MS-DOS 6.21 - Win. for Wrkgrp. 3.11
Desktop case standard

25MHz-486SX Super Saver

\$1,199

Lease as low
as \$58/mo.

Insight 486 VL

Fully Upgradable Intel 80486 CPU
2 VESA VL-Bus Comp. Slots
4MB RAM - 128K Cache
420MB 12ms IDE Hard Drive
32 Bit VL-Bus™ Comp. IDE Contrlr.
32 Bit VL-Bus™ Comp. 1MB
Graphics Accelerator SVGA Card
14" N.I. SVGA Color Monitor
1.44 MB 3.5" Floppy Drive
2 Serial Ports, 1 Parallel Port
Enhanced 101 Key Keyboard - Mouse
MS-DOS 6.21 - Win. for Wrkgrps. 3.11
Desktop Case, Full Tower Available

66MHz-486DX2 Insight 486 VL

\$1,599

Lease as low
as \$82/mo.

33MHz-486DX.....	\$1,479
50MHz-486DX2.....	\$1,499
66MHz-486DX2.....	\$1,599
100MHz-486DX4.....	\$1,899

Pentium™, Intel DX4 and Intel Inside are registered trademarks of Intel Corporation.



Add a REVEAL™ multimedia kit for \$349

Includes drive, sound board, stereo speaker
set, headphones and FREE CD software.
MMRVMF02

Add an internal Tape



Backup for only \$179

Talon 250MB with data compression,
includes two FREE tapes.



MAG™ Upgrade from 14" to 17" monitor for only \$439

1280 x 1024, non-
interlaced, .28mm
dp, MPR II.

800-755-9676

NOTEBOOKS

TEXAS INSTRUMENTS

Hit the trail with a winner!



NEW
Intel DX4
75 MHz

\$4,469

Lease As low as \$199/Mo.

TravelMate 4000E DX4™/75MHz Color

486DX4 75MHz CPU, 8.4" Active Matrix Color Display, 4MB RAM expandable to 20MB, 340MB Hard Disk Drive, High speed video system with 1MB of video RAM, 4mm full-travel keyboard, 3-5 hours battery life.

TEXTMD4753..... \$4,469

9.5" Active matrix color, 455MB
TEXTMD4754..... \$5,899

NEW!

TravelMate DeskTop Intelligent Docking System

Auto load and eject, Six 16-bit ISA card slots, Four drive bays, Two PCMCIA Type III card slots, Desktop or tower, Windows for Workgroup upgrade, Designed for all Travel Mates with QuickPort™ connection.

\$779

TEXTDOCKST



TOSHIBA

Authorized Vendor of Genuine Toshiba
Notebooks and Accessories.

T1950

486DX2-40MHz, 4MB RAM (exp. to 20MB) PCMCIA Slot, 9.5" Display, 200MB, Monochrome..... 2,089
200MB, Dual Color..... 2,679
200MB, Active Color..... 2,999
320MB, Active Color..... 3,399

T4700

486DX2-50MHz, 8MB RAM
200MB, Dual Scan Color..... \$3,969
320MB, Dual Scan Color..... 4,269
340MB, Active Color..... 4,799
200MB, Active Color..... 4,579

T4800 Multimedia

Intel 486DX4-75MHz, 16KB int. cache, 8MB RAM exp. to 24MB, 500 MB hard drive, 2PCMCIA slots, 9.5" active Matrix display, windows sound system, run time video for windows, indeo video.
500MB, Active color... \$5,599

Call for your FREE catalog.
Toshiba Accessories
Hotline 800-959-4100



NEW!



T1910

486SX-33MHz, 4MB RAM exp. to 20MB, PCMCIA, 9.5" display, 200MB Mono..... \$1,699
120MB Dual Scan Color..... 2,129
200MB Dual Scan Color..... 2,349

Portégé Less than 5lbs., 4MB RAM, 120MB Hard Drive, 33MHz SL Enhanced i486SX and Type II PCMCIA slot.
T3400 Mono..... **\$2,199**
Active Matrix Color..... 3,449

NEC Versa E 486 DX2

40MHz 120MB HD Mono..... \$2,579
40MHz 120MB HD Active Clr... 3,825
40MHz 250MB HD Active Clr... 4,234
50MHz 209MB HD Active Clr... 4,499
50MHz 340MB HD Active Clr... 4,919

AST COMPUTER

The Product Of Our Obsession

AST PowerExec 486SL/33

200MB/4MB Active Color..... \$4,199
340MB/8MB Active Color..... 4,499
200MB/4MB Monochrome..... 2,599
340MB/8MB Monochrome..... 2,899



"It's a quality desktop replacement...most powerful portable we've seen. One of the lightest units in the entire test group."

PC Magazine, March '90

"In our battery tests, the TI 4000 WinDX2/50 achieved a magnificent 6 hours and 24 minutes."

Portable Computing, April/May '90

"TI has done more to customize and optimize Windows than the other notebook vendors."

Windows Magazine, February '90



\$3,699

As low as \$109/Mo.

TravelMate 4000E WinDX2™/50 Active Matrix Color

486DX2 50MHz CPU 8.4" Active Matrix Display Pre-installed Windows 3.1™ and MS DOS® 4MB RAM, expandable to 20MB 200MB Hard Disk Drive MS Ball Point® with QuickPort™ Connection. TEXTMD250C..... \$3,699

4000E WinDX2™/40 Dual Scan Color

4MB RAM, 200MB Hard Drive
TEXTMD240D..... \$2,679

4000E WinDX2™/50 Dual Scan Color

4MB RAM, 200MB Hard Drive
TEXTMD250D..... \$2,979

4000E WinDX2™/50 Mono

4MB RAM, 640x480 VGA 10" Display
TEXTMD250E..... \$2,399



\$1,999

As low as \$104/Mo.

TravelMate 4000E WinSX™/25 Color

486SX 25MHz CPU 640 x 480 VGA 8.2" Color Display 256 Colors Simultaneously Pre-installed Windows 3.1™ and MS DOS® 4MB RAM, expandable to 20MB 120MB Hard Disk Drive MS BallPoint® with QuickPort™ Connection. TEXTMS25CE..... \$1,999

TravelMate 4000E WinSX™/25 Mono (120MB)

4MB RAM, 640 x 480 VGA 10" Display. TEXTMS25E..... \$1,699

Internal Fax/Modem

14.4/14.4 bps Fax/Modem
TEXT14.4MB..... \$279

Lotus Organizer!

with purchase of any TI notebook..... \$49

PCMCIA Cards

Intel Fax/Modems

2400/9600 bps MBINT6810..... \$159
9600/9600 bps MBINT6820..... 229
14.4/14.4 bps MBINT6830..... 239

H Hayes Fax/Modems

2400/9600 bps MBHA01245..... \$249
14.4/14.4 bps MBHA01364..... 329

Kern

Ethernet BNC NWXECE10B2..... 199
Ethernet Combo NWXECE10BC..... 259
Ethernet RJ-45 NWXECE10BT..... 219
Modem/Ether RJ-45 NWXECEM10T.499

Adaptec Fax/Modem

14.4/14.4 bps MBPPCMCIA..... \$299

Kingston

Ethernet BNC KT263238..... \$179
Ethernet RJ-45 KT263238..... 169

National Semi

Ethernet RJ-45 NWN54100..... \$199

Apex

Ethernet RJ-45 NWAP10B2..... \$259
Faxmodem 14.4/14.4 MBAP1414..... 319

AT&T

Faxmodem 14.4/14.4 MBATT3761. \$329

Supra

Faxmodem 14.4/14.4 MBSUP5014.. \$299

Maxtor

Hard Drive 105MB MXL105..... \$489

MiniStar

Hard Drive 42MB MTMP42P..... \$299
Hard Drive 85MB MTMP85P..... 399

QLogic

Interface SCSI QLFSPCMCIA..... \$189

Megahertz

PCMCIA 2.0 Modem with XJACK™ retractable phone connector.
2400/9600 bps. MBXJ124FM..... \$199
14.4/14.4 bps. MBXJ1144..... \$329

Boca Research

Fax/Modem 14.4 bps MBBC144P. \$299
Ethernet RJ-45 NWCBCEN1PA..... 159

U-Satellite Fax/Modems

14.4/14.4 bps MBUSR0442..... \$279
2400/9600 bps MBUSR0443..... 279

New Media

Sound Card 16bit MMNMC00168. \$299
SCSI Interface..... 279
Ethernet RJ-45 NWNMC00035..... 179

Verbatim

SRAM 1MB MEV889137..... \$229
SRAM 2MB MEV889138..... 299

Thomas Conrad

Token Ring 16/4 NWTC4041..... \$659



800-755-9676

MONITORS

NSA HITACHI

SuperScan™ 15s

Hitachi's best 15-inch digitally controlled monitor for windowing, business graphics, imaging and multimedia applications. SuperScan 15s features advanced flat screen, anti-glare CRT technology, 0.28mm dot pitch, up to 1280 x 1024 NI, 21 screen presets, low ELF and VLF emissions, MPR II and energy star compliant, plus pin cushion and trapezoid adjustments. CM1586..... \$499

SuperScan™ Elite 17"

Hitachi's best 17-inch digitally controlled monitor delivers more features than the competition. Advanced .26 mm dot pitch CRT with new anti-glare coating technology, MPR II and energy star compliant, true color RGB control plus white balance selection, 31 screen presets, pin cushion and trapezoid adjustments, 1600 x 1200 NI at 66 Hz and computer keyboard control with optional kit. CM1797..... \$1,199

NSA Super 17s

New 17" price/performance leader! Hitachi 0.26 mm dot pitch CRT for crisp images. Digital microprocessor controls for RGB color, pin cushion, and 18 screen presets. MPR II, Vesa, and Energy Star compliant. FREE Energy Saving Software included! (Windows 3.1 and DOS versions. Does not require PC to be DPMS compliant) 1280 x 1024 NI. CM2095MU..... \$1,349



SuperScan™ Pro 20"

Hitachi's best digital 20 inch monitor featuring new brighter .31 dp CRT with dual dynamic focus for sharper images. MPR II compliant, 30 screen presets, and up to 1600 x 1200 NI resolution for less than competition! Perfect for CAD/CAM, color imaging, and multimedia. CM20M7..... \$1,649

SuperScan™ 20s

Today's best value in a brand name 20-inch monitor for desktop publishing, the SuperScan 20s features Advanced black matrix CRT with dynamic focus, new anti-glare technology, low ELF and VLF emissions meeting the Swedish MPR II standard, resolutions up to 1280 x 1024, Pin cushion adjustments, 24-bit true-color imaging. Two inputs enabling dual system configuration. All this, Hitachi's reputation for quality, reliability and value. CM2095..... \$1,349

SuperScan™ Elite 21"

Hitachi's high end digital 21 inch monitor offers industry leading features including an advanced flat, square .28 mm dp CRT for sharp focus, 31 screen presets. True color control plus white balance selection, MPR II low emissions, Energy Star, and pin cushion adjustment. 1600 x 1200 NI at a flicker free 70 Hz refresh rate. Optional keyboard computer control kit available. CM2188..... \$2,399

PRINTERS

EPSON

Affordable as an ordinary Inkjet, but its print quality is extraordinary.

- Crisp laser-sharp printing
- Amazingly sharp, clean output of text and graphics at 360 dots per inch
- Convenient paper handling - High capacity 100 sheet plain paper tray cuts down on reloading.
- Easily handles single envelopes and transparencies.
- Fast, quiet and compact - 150 characters per second. Whisper-quiet, at 45 dB (A). Very compact at 17" x 10.5".
- Your choice of fonts - Seven built-in typefaces, with four scalable fonts. Windows™ compatible.



EXPERTS' Windows PICK

Epson Stylus 800

- Epson support
- Two-year limited warranty and toll-free Epson Connection™ technical support hotline to answer your questions.
- Award Winning - Won leading industry magazine awards for Best Value, Top Rated and Experts' Pick for ink jet printers.

Epson Stylus 800 EPSST800.....

\$319

Epson AP3250.....	\$174
Epson LX-810.....	169
Epson FX-870.....	274
Epson LQ-570+.....	239
Epson LQ-1070+.....	359

Epson LQ-870.....	\$439
Epson LQ-1170.....	589
Epson LQ-2550 Color.....	879
Epson DFX-5000.....	1,319
Epson DFX-8000.....	2,199

VIDEO CARDS

Western Digital Paradise Accelerator Value Card

The Paradise Accelerator Value Card is a super VGA video graphics card that accelerates the performance of Windows and windowing programs and provides resolutions up to 1280x1024 in 16 colors, or up to 65,536 colors for 800x600 resolution. Opening, closing, scrolling and resizing of windows is faster because the Paradise Accelerator Value Card features built-in acceleration.

- 1MB SVGA 72MHz refresh rate
- Video Controller
- Supports up to 1280 x 1024 resolution
- Supports up to 65,536 colors.

Paradise Accelerator Value Card **\$79**
VCXLR8VAL.....



Local Bus Windows Accelerator Supports up to 1024x768x256 color at 72Hz, up to 16.8 million colors. 1MB. Over 50 times faster performance under Windows than a standard ISA. VCXLRVL33..... \$139

Windows Accelerator	
VCXLRPRO14.....	\$239
24 Bit Color Accelerator	
VCXLR24BIT.....	119

TEXAS INSTRUMENTS

microWriter

For years, capability and affordability were mutually exclusive features of laser-quality printers. You get sharp, crisp laser-quality images and rapid 5ppm operation -- all in one very affordable printer. They make a small business look a lot bigger, and a big business look a lot smarter.

Ti microWriter PS23	
LED 5ppm 2MB.....	\$679
Ti microWriter LED 5ppm 512K.....	499
Ti microWriter PS65 LED	
5ppm 2MB.....	929

Redefining your expectations of office printers.

microLaser Pro 600

Razor-sharp 600dpi printing with 6MB RAM. DOS, Windows and Mac compatible. Fast 8ppm print speed with RISC processor. TI microLaser Pro PS23



TEX1024.....	\$1,349
Ti microLaser Pro PS 65	
TEX1026.....	\$1,529
Ti microMarc	
TEX1023.....	\$279

Nokia 445x 21" CM445M.....	\$2,399
Nokia 445M 21" CM445MTCO 2,599	
Nokia 447M 17" CM447B.....	1,199
Nokia 448S 14" CM448S.....	499
Mag ECO - 15" Power Down	
Support 1280 x 1024	
CMX115.....	\$399
Mag ECO - 17" 28dpi SVGA	
1280 x 1024 CMX115F.....	699

MicroScan 4G 15"	
1024 x 768 NI, 28 dot pitch,	
SVGA color. CM551SG.....	\$469
MicroScan 5A 17"	
17", flat screen, 1024 x 768,	
28mm dot pitch. CM5517.....	\$899

MultiSync 4FGe 15", 28dp, NI	
CMNEC4FGe.....	\$679
MultiSync 5FGe 17", 28dp, NI	
CMNEC5FGe.....	1,079
MultiSync 5FGP 17", 28dp, NI	
CMNEC5FGP.....	1,249



800-755-9676

15", 1024x768, NI, 28mm dp.	
CM1561LR.....	\$399
17", 1280x1024, NI, 28mm dp.	
CM1760LR.....	749
20", 1280x1024 NI.	
CM2085MU0.....	1,249

LEXMARK.

2380.....	\$319
2381+.....	449
2390+.....	329
2391.....	449
Exec Jet II.....	279
4037SE Laser.....	649
4039 10R.....	1,339

NEC

P3200 24 Pin NCMDL3200.....	\$229
P6200 24 Pin NCMDL6200.....	424
Silentwriter 1097 NCMDL1097.....	1,429

FUJITSU

Print Partner 10 FJPP10.....	\$799
Print Partner 10W FJPP10W.....	849

star

NX-2450 24 Pin Color.....	\$249
LS-5EX Laser.....	749
SJ-144 Color Laser.....	459
SJ-48+ Ink Jet.....	279

HEWLETT* PACKARD

HP DeskJet 520 Printer

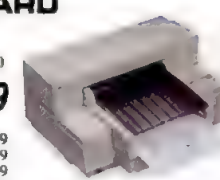
Incredible high quality 600x300 dpi printer at amazingly low price. HPDJ520..... **\$299**

DeskJet 310 HPDJ310.....	\$289
DeskJet 500 HPDCJ500.....	279
DeskJet 500C HPDCJ500C.....	369
DeskJet 550C HPDCJ550C.....	469
DeskJet 560C HPDJ560C.....	545
DeskJet 1200C HPDJ1200C.....	1,475
DeskJet 1200C PS HPDJ1200CP.....	2,199

Panasonic

Office Automation

KX-P4410 Laser.....	\$589
KX-P4430 Laser.....	689
KX-P4440 Laser.....	1,149
KX-P2023 Dot Matrix.....	195
KX-P2124 Dot Matrix.....	315
KX-P3123 Dot Matrix.....	289
KX-P3624 Dot Matrix.....	409



BJ-10SX CNBJ10SXW.....	\$249
BJ-230 CNBJ230.....	399
BJ-200E CNBJ200E.....	289
BJC-600 CNBJ600.....	589
BJC-820 CNBJ820.....	1,590
LBP430 CNLBP430.....	589
LBP860 CNLBP860.....	1,399

Canon

20,000 PRODUCTS 24 HOURS A DAY.

SOFTWARE 1000's of titles
We will not be undersold!

Lotus

Lotus SmartSuite 2.1

If you use Lotus products or competitive spreadsheets, databases, word processors or presentation graphics, this incredible offer is for you. Lotus SmartSuite Upgrade is the only complete solution for Windows - five, full-featured applications for the low price of just \$259!

SWRWSLO89... **\$259**



Lotus Hotline
800-998-8027

Upgrade from Excel, Quattro Pro, Word, WordPerfect, Windows Display Writer, PowerPoint, Harvard Graphics, Corel Draw, WordPerfect Presentation, Aldus Persuasion, MS Access, Paradox, dBASE, FileMaker Plus, Lotus 1-2-3, Symphony, Auto Pro, Freelance Graphics and Graphwriter. Must provide proof of ownership. Call for details. All prices refer to 3.5" Windows version. DOS versions and prices available by request.



Lotus 1-2-3 v4.01

Lotus 1-2-3 v4.01 is designed to be the easiest Windows spreadsheet ever built. It delivers phenomenal new technology to maximize the productivity of both individual and workgroup users. Excel compatibility offers seamless transition to 1-2-3.

SWRWSLO84... **\$279**

Lotus 1-2-3 Upgrade

SWRWSLO85... **\$89**

SmartSuite 2.1 SWRWSLO89	\$399
SmartSuite Upgrade SWRWSLO89	\$259
Lotus 1-2-3 4.01 SWRWSLO84	\$279
Lotus 1-2-3 4.01 Upgrade SWRWSLO85	\$89
Approach 2.1 SWRWSLO86	\$89
Freelance Graphics SWRWSLO11	\$99

CAMBRIX



Complete House

A multimedia exploration of American residential architecture for people who may be building, remodeling or just interested in house design.

SWRWCQ013	\$29
Complete House SWRWCQ013	\$29
Small Blue Planet SWRWCQ07	\$29
Fractal Canyon SWRWCQ05	\$29
A Line in the Sand SWRWCQ02	\$29
Electricity and Magnetism SWRWCQ03	\$29
Sound Kitchen SWRWCQ010	\$29

Small Blue Planet

Unveil both the splendor of earth as seen from space and the delicate balance of our planet through spectacular satellite imagery. Best of all, it's interactive. Combines the hard facts of an atlas with the graphic splendor of a coffee-table book.

SWRWCQ07... **\$43**

The Anglo Saxons SWRWCQ08	\$35
Adventures SWRWCQ04	\$35
National Parks SWRWCQ01	\$35
Carnegie Scott	\$35
Learn to Fly Guller SWRWCQ11	\$35
Earth and Universe SWRWCQ03	\$35
Sound Kitchen SWRWCQ010	\$35

PRINTERS

OKIDATA	
OLADICE Laser	\$900
OL160 Laser	\$825
OL160 Dot Matrix	\$299
ML580 Dot Matrix	\$419
ML184 Dot Matrix	\$229
ML220 Dot Matrix	\$299
ML321 Dot Matrix	\$419
ML385 Dot Matrix	\$499
ML385C Dot Matrix	\$1,019
ML520 Dot Matrix	\$385
ML521 Dot Matrix	\$489
ML591 Dot Matrix	\$567
OL300 Dot Matrix	\$1,079

UPS

American Power Conversion	
Surge Arrest	\$19
Backup-UPS 250	\$99
Backup-UPS 400	\$149
Backup-UPS 900	\$299
Smart-UPS 400	\$299
Smart-UPS 900	\$599
Smart-UPS 2000	\$1,199
Smart-UPS 3000	\$1,599

Upsonic

PC Might 25 UPS/PCMS25	\$89
PC Might 35 UPS/PCMS35	\$149
PC Might 55 UPS/PCMS55	\$239

MEMORY/SIMM

1MB x 90nm	SCall
1MB x 70nm	Call
256KB x 70nm	Call
4MB x 70nm	Call
512 x 30 2MB	Call
1 x 36 4MB	Call
2 x 36 8MB	Call
4 x 36 16MB	Call

NETWORKING

3Com	
Etherlink II 16 to 3C503	\$154
Etherlink II 10 Base T 3C508	\$129
Etherlink II Coax 3C509	\$279
Etherlink II Combo 3C509	\$279
Etherlink II 416 10 pack 3C515	\$1,899
Etherlink II 32 bit 10 Base T 3C579	\$339
ARTISOFT	
142-80 AE-3 Starter Kit	\$479
158-50 AE-2 Window Starter Kit	\$699
214-50 AE-3 DOS Single	\$89
314-50 AE-3 Windows Single	\$179
643 NodePurser 2000c	\$179
SMC	
Ethernet+ Elite 16T	\$129
Ethernet+ Elite 16T 6 Pack	\$79
Thomas Conrad	
TC-4045 164 Term Ring	\$349
intel	
Intel Ether Express 16	\$99
Intel Ether Express 16TP	\$105
Intel Ether Express Pro/100	\$129
Intel Ether Express EISA Coax	\$219
Novell Netware V 4.01	
*Available only on CD	
6 User	\$929
50 User	\$3,699
100 User	\$5,999
250 User	\$9,999
1000 User	\$17,999
Xarcom	
PE3-1082 Pocket Ethernet	\$299
PE3-1083 Pocket Ethernet	\$299
PE3-1087 Pocket Ethernet	\$399
PP3-03 Parallel Port Multiplexer	\$99
PP3-03 Parallel Port Multiplexer	\$99

REMOVABLE STORAGE

FUJITSU	
330MB Fujitsu Internal Magneto Optical (PC)	\$1,099
230MB Fujitsu Optical (Mac)	\$99
Bermoult	
Bermoult PC Powered 150	\$499
Bermoult PC Powered 150	\$499
Bermoult Mac/Transparent 150	\$599
Bermoult PC25 Interface Card	\$109

TAPE BACKUPS

COLORADO MEMORY SYSTEMS	
250MB COJUMBO250	\$199
120MB COJUMBO	\$99
Trakstar 250MB COJUT20	\$219
Trakstar 120MB COJUT10	\$119
CONNER	
TapeStar 250MB Internal A250	\$149
TapeStar 250MB Ext. Exp. A250EP	\$39
MEGA	
Image Tape250 Internal Half-height	\$189
Image Tape250 PC Powered Ext.	\$79
Talon	
250MB Internal	\$179
with unformatted tapes TBT250BK	\$229
with formatted tapes TBT250BK	\$229
WangDAT	
4mm DAT 200 Int. 16 Bit Kit	\$699
4mm DAT 400 3200 Int. 16 Bit Kit	\$1,049
4mm DAT 400 3200 Ext. 16 Bit Kit	\$1,199
4mm DAT 800 3200 Int. 16 Bit Kit	\$2,399
EXABYTE	
8mm 5.0 Gb Model 8505	\$2,599
8mm 2.2 Gb Model 8205	\$1,899
8mm Tape Graphics	\$695

MODEMS

intel	
Intel Internal 14.4 modem	\$139
Intel SafeFax 100	\$9
Intel SafeFax 200	\$225
Intel SafeFax 300	\$245
Intel SafeFax 300	\$269
Intel SafeFax 400	\$289
Intel SafeFax 400	\$289
Hayes	
Hayes Ultra 16 Modem	\$399
Hayes Ultra 144 Modem	\$399
Hayes Optima 24+ Fax 96	\$199
Hayes Optima 96V EZ	\$349
Hayes Optima 144V EZ	\$399
Husky	
PM14400FX Internal V.32bis	\$239
PM14400FX PXT Pocket V.45S	\$39
PM14400FX Internal V.42bis	\$219
PM14400FX External LCD	\$369
PM14400FX External	\$219
PM1600FX External	\$229
PM1600FX Internal	\$209
PM2400FX External	\$259
PM2400FX Internal	\$239

MATH COPROCESSORS

intel	
80287XL	\$99
80387 (BX)	\$99
80387 (DX)	\$99

INPUT DEVICES

Digital Electronic Mouse	
Logitech Mouse Man serial	\$45
Logitech Mouse Man bus	\$79
Logitech Trackball Personal	\$79
Logitech ScanMan 256	\$299
Logitech ScanMan Color w/Omni	\$299
Logitech Photo Man	\$49
Kurita XLP 12" 12" Digitizer	\$239

INTEL OVERDRIVE

OverDrive 486SX20	\$329
OverDrive 486SX25	\$329
OverDrive 486SX25	\$329
OverDrive 486SX25	\$329

FASTER

■ Fully automated Federal Express delivery.
■ 24-hour delivery on our most popular systems.
■ 98% of in-stock items delivered next business day.

CHEAPER

■ Simply the lowest prices. ■ Our tremendous buying power means savings to you. ■ Wide range of payment options including low-cost leasing.
■ Use your Insight Credit Card - no down payments. No annual fee. ■ Call for a copy of our NEW Insight catalog - A shopper's paradise - FREE!



Double speed! CD-ROM DRIVES

CHINON	
Model CD655	\$429
NEC	
Model 04	\$399
Model 2nd Internal	\$519
Model 2nd External	\$519
Model 2nd External	\$519
Talon	
Talon OS-100 320mb/330KB	\$199
Talon OS-200 245mb/330KB	\$349
TEAC	
Model CD-3050	\$399
TOSHIBA	
Model 3401	\$449

MULTIMEDIA

CREATIVE	
Sound Blaster MDI Kit	\$99
Sound Blaster 16 MB CD	\$199
Sound Blaster 16 CD ASP	\$209
Sound Blaster 16 SCSI	\$199
Sound Blaster Deluxe	\$299
Sound Blaster 16 SCSI ASP	\$219
Sound Blaster 16 Basic	\$143
Sound Blaster Pro Deluxe 8 Bit	\$99
SB5300 Speaker Set by Yamaha	\$99
Video Spigot for Windows	\$49
Video Blaster	\$449
Wave Blaster Board	\$189
MEDIA TION	
Pro 16 MM System II Internal	\$529
Pro 16 CD II	\$119
Fusion Double CD 16 System	\$539
Double Fusion LX MM Kit Int.	\$399
Memphis External MM Kit	\$599
Pro MIDI Male Option Kit	\$45
Pro Move Spectrum	\$309
Pro Audio Spectrum 16 Board	\$129
Pro Audio Spectrum 16 Basic	\$109
Pro Audio Studio 16 w/ mic	\$189

REVEAL

MultiMediaFX - 02 Int. drive, double speed, 300kb transfer, 16 Bit sound, speakers, microphone and 21 files	\$349
MultiMediaFX - 04 Int. drive, double speed, 300kb transfer, 16 Bit sound, speakers, microphone and 21 files	\$479
MultiMediaFX - 08 Int. drive, double speed, 300kb transfer, 16 Bit sound, speakers, microphone and 21 files	\$599

QUANTUM

170MB IDE	QULPS170A	12ms	3.5" HH	\$189	\$209
270MB IDE	QULPS270A	9ms	3.5" HH	249	269
340MB IDE	QULPS340A	12ms	3.5" HH	279	299
540MB IDE	QULPS540A	12ms	3.5" HH	509	529
1080MB SCSI	QUEM1080S	9ms	3.5" HH	829	979
1225MB SCSI	QUPI1225S	10ms	3.5" HH	949	1,009
1800MB SCSI	QUPI1800S	10ms	3.5" HH	1,049	1,199

Seagate

130MB IDE	ST3145A	15ms	3.5" HH	\$189	\$209
210MB IDE	ST3243A	14ms	3.5" HH	209	229
260MB IDE	ST3290A	14ms	3.5" HH	219	239
340MB IDE	ST3390A	11ms	5.25" FH	289	309
340MB SCSI	ST3390S	11ms	5.25" FH	359	379
452MB IDE	ST3550A	12ms	3.5" HH	399	419
452MB SCSI	ST3550S	12ms	3.5" HH	409	429
540MB IDE	ST3655A	12ms	3.5" HH	439	459
540MB SCSI	ST3655S	12ms	3.5" HH	459	479
1050MB SCSI	ST31200N	11ms	3.5" HH	799	949
1700MB SCSI	ST11900N	9ms	3.5" HH	1,099	1,249
2100MB SCSI	ST12400N	10.5ms	3.5" HH	1,449	1,599
2800MB SCSI	ST13400N	11ms	5.25" FH	2,009	2,249

HARD DRIVES

HARD DRIVES	
International	
Complete installation kit, including: 5 1/4" mounting frame, Data Cable, Rail Set, Screws, Jumper Blocks & Bezel. HD's Hard Drive Installation Guide with step-by-step installation instructions.	
Capacity	Interface
Model	Access
FF/Height	Bar
Kit	

WESTERN DIGITAL

170MB IDE	WDAL2170	12ms	2.5"	\$319	---
210MB IDE	WD2120A	12ms	3.5" HH	209	\$229
250MB IDE	WD2250A	12ms	3.5" HH	219	239
270MB IDE	WD2170S	12ms	3.5" HH	229	249
340MB IDE	WD2340A	12ms	3.5" HH	269	289
420MB IDE	WD2420A	12ms	3.5" HH	299	319
540MB IDE	WD2540A	12ms	3.5" HH	429	449

CONNER

170MB IDE	CP3017A	17ms	3.5" HH	\$189	\$209
250MB IDE	CP3025A	16ms	3.5" HH	229	249
340MB IDE	CP3034A	13ms	3.5" HH	309	329
340MB SCSI	CP3034S	13ms	3.5" HH	359	379
545MB IDE	CP3054A	10ms	3.5" HH	579	599
545MB SCSI	CP3054S	10ms	3.5" HH	649	709

FUJITSU

520MB IDE	FJ2624A	12ms	3.5" HH	\$499	\$519
520MB SCSI	FJ2624S	12ms	3.5" HH	519	539
1050MB SCSI	FJ2654S	10ms	3.5" HH	849	909
2060MB SCSI	FJ2654S	12ms	5.25" FH	1,299	1,449

Maxtor

130MB IDE	MX7131A	15ms	3.5" HH	\$189	\$209
250MB IDE	MX7245A	15ms	3.5" HH	219	239
250MB SCSI	MX7345S	15ms	3.5" HH	269	289
340MB IDE	MX7345A	12ms	3.5" HH	299	319
340MB SCSI	MX7345S	12ms	3.5" HH	349	369

MICROPOLIS

976MB IDE	MC2110A	10ms	3.5" HH	\$829	\$849
1050MB SCSI	MC2110S	10ms	3.5" HH	839	859
1626MB IDE	MC2217A	10ms	3.5" HH	1,099	1,119
1750MB SCSI	MC2217S	10ms	3.5" HH	1,099	1,249
2100MB SCSI	MC1826	11ms	5.25" FH	1,399	1,549
3000MB SCSI	MC1936	11ms	6.25" FH	2,089	2,249

Quantum

170MB	IDE	QULPS170A	12ms	3.5" HH	\$189	\$209
270MB	IDE	QULPS270A	9ms	3.5" HH	249	269
340MB	IDE	QULPS340A	12ms	3.5" HH	279	299
540MB	IDE	QULPS540A	12ms	3.5" HH	509	529
1080MB	SCSI	QUEM1080S	9ms	3.5" HH	829	979
1225MB	SCSI	QUPI1225S	10ms	3.5"		
1680MB	SCSI	QUPI1680S	10ms	3.5"		



Searching for a brand name you can really trust? Sunshine delivers with Sales, Support and Service.



SUNSHINE COMPUTERS

1-800-828-2992

- ALL ITEMS CARRY A ONE YEAR WARRANTY
- 15-DAY RETURN POLICY
- ALL ITEMS RETURNED MUST INCLUDE ORIGINAL PACKAGING AND DOCUMENTATION
- NO RETURNS WITHOUT RMA NUMBER
- SHIPPING AND HANDLING NON REFUNDABLE
- ALL RETURNS SUBJECT TO A RE-STOCKING FEE
- NOT RESPONSIBLE FOR TYPOGRAPHICAL ERRORS
- SOFTWARE NOT RETURNABLE
- LASER PRINTERS NOT RETURNABLE

DISCOVER THE MAGIC



MidWest Micro



You don't have to be psychic to send and receive messages, at least not when you have Elite's P5-60 PCI System. Complete with an internal 14.4 Kbps fax modem, a large 528 Mb hard drive and the power of Pentium, this value-priced PC puts the future of computing at your fingertips.



MidWest Micro

1-800-682-7256



 **Seagate**

Maxtor®

Is An Intel-Based Elite System In Your Future?

Ask the crystal ball. What does it see? An image is materializing...customers paying too much for computer technology. Poor souls, haven't they heard of MidWest Micro? Luckily, you aren't among them. Ah, there you are. Over there on the phone.

You don't need a medium to tell you about the performance of Elite VESA and PCI Systems. With processors ranging from the entry-level 486SX-33 to the Pentium P5-60 (a 64-bit processor that operates twice as fast as a DX2-66 processor), they provide values that are out of this world!

Known for their 32-bit technology, VESA Local Bus Systems offer show-stopper graphics on a value-minded budget.

PCI Local Bus Systems offer superior compatibility, automatic configuration and high-speed data handling. Vibes say that you're still skeptical about PCI technology, so let me also tell you that systems using a PCI bus offer the best expandability for peripheral devices, leaving plenty of room for future upgrades. And since the PCI bus is self-configuring, you can add network cards, video cards and other peripherals with true plug and play operation!

Phenomenal Value

Take the guess work out of buying a computer system...order from MidWest Micro. Otherwise you might be watching your money disappear into thin air. Most of our systems come with reliable Seagate hard drives, three-year warranties, Windows For Workgroups 3.11 and DOS 6.2 installed.

The Real Three-Year Warranty From The Company That Won't Disappear After The First Act

No other computer company has attempted a feat like the one you are about to witness. With one pass of the magic wand, VOILA! We've extended the warranty on Elite Desktop Systems from one year to three years! Breaking a well-established tradition in the computer industry, this warranty is complete. That means all of the system's internal components, the hard drive and the monitor are covered for three full years! Only a company that's confident in its act can offer a warranty like this plus a **30-Day Money Back Guarantee, Immediate Parts Replacement Policy, Lifetime Toll-Free Technical Support** and round-the-clock information via our **On-Line Bulletin Board Service**.

VESA SYSTEMS

486DX2-66 \$1999

#006677

- Intel 486DX2-66 Processor
- 8 Mb RAM, 128 Kb Cache
- 340 Mb IDE Hard Drive
- 32-Bit VESA Local Bus Graphics with 1 Mb
- 32-Bit VESA Local Bus IDE
- Double Speed CD-ROM Drive
- 3.5" Disk Drive
- 15" SVGA .28 N/I Multi-Scan Color Monitor with Hitachi CRT
- 8-Bay Mini-Tower Case
- 5 ISA and 3 VESA/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS DOS 6.2 and WFW 3.11

486DX-33 \$1879

#007808

486DX2-50 \$1899

#007809

DX4-75 \$2499

#007810

- Intel DX4-75 Processor
- 16 Mb RAM, 128 Kb Cache
- 340 Mb IDE Hard Drive
- 32-Bit VESA Local Bus Graphics with 2 Mb
- 32-Bit VESA Local Bus IDE
- Double Speed CD-ROM Drive
- 3.5" Disk Drive
- 15" SVGA .28 N/I Multi-Scan Color Monitor with Hitachi CRT
- 8-Bay Mini-Tower Case
- 5 ISA and 3 VESA/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS DOS 6.2 and WFW 3.11

486DX2-66 \$2299

#007811

DX4-100 \$2999

#007812

- Intel DX4-100 Processor
- 16 Mb RAM, 128 Kb Cache
- 528 Mb IDE Hard Drive
- 32-Bit VESA Local Bus Graphics with 2 Mb
- 32-Bit VESA Local Bus IDE
- Double Speed CD-ROM Drive
- 3.5" Disk Drive
- 17" SVGA .28 N/I Multi-Scan Color Monitor with Hitachi CRT
- 8-Bay Mini-Tower Case
- 5 ISA and 3 VESA/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS DOS 6.2 and WFW 3.11

SERVICE

Every MidWest Micro Elite is backed by:

- 3 Year "Real Warranty" on desktops
- 1 Year Warranty on portables
- 30-Day Money Back Guarantee
- Immediate Parts Replacement Policy
- Lifetime Toll-Free Technical Support
- On-Line Bulletin Board Service



PCI AND PENTIUM SYSTEMS

DX4-100 PCI \$2299

#007813

- Intel DX4-100 Processor
- 8 Mb RAM, 256 Kb Cache
- 452 Mb IDE Hard Drive
- PCI Local Bus Graphics
- Double Speed CD-ROM Drive
- 3.5" Disk Drive
- 15" SVGA .28 N/I Multi-Scan Color Monitor with Hitachi CRT
- 8-Bay Middle-Tower Case
- 3 ISA, 2 PCI and 1 PCI/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS DOS 6.2 and WFW 3.11

P5-60 \$2499

#007814

- Intel 60 MHz Pentium Processor
- 8 Mb RAM, 256 Kb Cache
- 528 Mb IDE Hard Drive
- PCI Local Bus Graphics
- 3.5" Disk Drive
- 14" SVGA .28 N/I Color Monitor with Hitachi CRT
- 8-Bay Middle-Tower Case
- 4 ISA, 2 PCI and 1 PCI/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS DOS 6.2 and WFW 3.11

P5-60 \$2999

#007815

- Intel 60 MHz Pentium Processor
- 8 Mb RAM, 256 Kb Cache
- 528 Mb IDE Hard Drive
- Intel PCI Local Bus Graphics
- Double Speed CD-ROM Drive
- Microsoft 3 Disk CD-ROM Software Library - Encarta, Works & Money
- 16-Bit High Performance Sound Card
- Digital Quality, Compact Speakers
- Internal 14.4 S/R FAX Modem
- 3.5" Disk Drive
- 15" SVGA .28 N/I Multi-Scan Color Monitor with Hitachi CRT
- 8-Bay Middle-Tower Case
- 3 ISA, 2 PCI and 1 PCI/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS DOS 6.2 and WFW 3.11

P5-60 \$3499

#007816

- Intel 60 MHz Pentium Processor
- 16 Mb RAM, 256 Kb Cache
- 528 Mb IDE Hard Drive
- Intel PCI Local Bus Graphics
- Double Speed CD-ROM Drive
- 3.5" Disk Drive
- 17" SVGA .26 N/I Color Monitor with Hitachi CRT
- 10-Bay Full Tower Case
- 3 ISA, 2 PCI and 1 PCI/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS DOS 6.2 and WFW 3.11

P5-60 \$3999

#007817

- With 1 Gb SCSI HDD & 14.4 Internal S/R FAX Modem

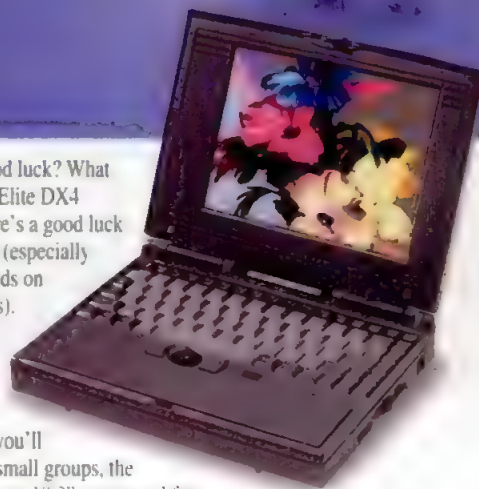


Because work doesn't stop when you leave the office, you need the Elite SubNote. Weighing only 3.9 pounds, it comes in handy in places you've never even thought of.

But don't just take our word for it, get the SubNote today and find out for yourself what you've been missing.

A rabbit's foot for good luck? What you really need is the Elite DX4 SoundBook. Now there's a good luck charm to carry around (especially if your business depends on powerful presentations).

Audiences love the colorful detail and melodious sound projected by this lightweight portable (you'll love the weight)! For small groups, the SoundBook offers a large 10.3" screen and for larger crowds, simultaneous video. Plus, 75 MHz processing speeds mean you won't be embarrassed by sluggish software during your demonstration. If your business depends on powerful presentations, depend on Elite's DX4 SoundBook.



MidWest Micro

6910 U.S. Route 36 East, Fletcher, Ohio 45326

1-800-682-7256

Fax: 1-800-562-6622

Monday-Friday: 9 a.m. to 7 p.m. Saturday: 10 a.m. to 4 p.m.



For your protection we check thoroughly for stolen credit cards.

Dealers Call:

1-800-682-0522



Reaching New Heights In Portable Computing

Easy To Pick Up, Hard To Put Down

Whether you're an amateur magician or a polished professional, we're positive that you'll be able to levitate our Elite line of 486 Notebooks and SubNotes (all under 6.9 pounds!).

Seeing Is Believing

Weighing only 3.9 pounds, the Elite 486SX-25 SubNote delivers spell-binding desktop power in a space-saving design. You'll find Intel's "SL Enhanced" 486SX-25 processor (designed especially for portable computers) inside, as well as 4 Mb of RAM and up to a 520 Mb hard drive. And with the SubNote's captivating 10" high-contrast screen and up to five hours of battery life, you'll never feel like you're sacrificing desktop quality for lightweight portability.

Presto! For a notebook you can see and hear try our color DX4 SoundBook. This notebook highlights the latest Intel clock-tripler chip for 75 MHz processing speeds and integrated audio features. You get a built-in microphone, a speaker and external jacks for sounds never before heard from a 6.9 pound notebook computer. Bundled audio accessory software for Windows and DOS environments lets you record, compress, store and playback voices, sounds or music. You'll also get local bus

accelerated video and 1 Mb video DRAM for true 24-bit color graphics on a whopping 10.3" dual-scan color screen.

Trying to steal the spotlight, our 486SX/DX Notebooks come with a large 9.5" monochrome, 10.3" dual-screen color or 9.5" active-matrix color screen and an upgradeable Intel processor. A PCMCIA Type III slot lets you add network adapters, modems and interchangeable hard drives.

Long On Battery Life, Short On Weight

All Elite 486SX/DX Notebooks and SubNotes operate on Intel's "SL-Enhanced" microprocessor. Known for low power consumption, the processor also delivers excellent power management for longer battery life.

A Hard Act To Follow

As you'll soon learn, the only tricks we have up our sleeves are the best products at the best prices in the computer industry. The proof lies in our 14 Computer Shopper Best Buy Awards chosen by Shopper readers and PC Computing's prestigious Five Star Rating for top-hat service and price performance.

ELITE NOTEBOOKS

ELITE SoundBook

- Intel 486, DX2 or DX4 Processor
- 4 Mb RAM (expands to 20 Mb)
- 9.5" Mono, 10.3" Dual-Scan, or 9.5" Active Matrix VGA Display
- Local Bus Video with 1 Mb Video DRAM
- Business Audio Features Including:
 - Built-in Microphone & Speaker
 - External Jacks for Line In & Line Out
- 3.5" Built-in Diskette Drive
- User Replaceable Hard Drive
- Two Type II/One Type III PCMCIA Slot
- Built-in Trackball
- NiMH Battery & AC Adapter
- Advanced Power Management with SMI
- One Parallel and One Serial Port
- External VGA and Keyboard Port
- MS DOS 6.2 & WFW 3.11
- Lotus Organizer
- Weight: Mono - 6.2 lbs. Color - 6.7 lbs.
- Carrying Case

Monochrome SoundBook

486SX-33 with 260 Mb HDD
#007334 **\$1499**

486DX-33 with 260 Mb HDD
#007335 **\$1699**

DX2-50 WITH 340 MB HDD
#007336 **\$1799**

Dual Scan Color SoundBook

486SX-33 with 260 Mb HDD
#007328 **\$1999**

486DX-33 with 260 Mb HDD
#007329 **\$2199**

DX2-50 with 340 Mb HDD
#007330 **\$2299**

DX2-66 with 520 Mb HDD
#007331 **\$2499**

DX4-75 with 340 Mb HDD & 8 Mb of RAM
#007332 **\$2799**

DX4-100 with 520 Mb HDD & 8 Mb of RAM
#007333 **\$2999**

Active Matrix Color SoundBook

DX2-66 with 340 Mb HDD & 8 Mb of RAM
#007337 **\$3499**

DX4-75 with 520 Mb HDD & 8 Mb of RAM
#007338 **\$3799**

DX4-100 with 520 Mb HDD, 8 Mb of RAM & PCMCIA 9624 S/R Fax Modem
#007339 **\$3999**

Elite 486SX SubNote

- Intel 486SX SL-Enhanced Processor
- 4 Mb RAM (expands to 12 Mb)
- 9.5" Mono or Dual Scan VGA Display
- Turbo Bus Accelerated Video
- 3.5" External Diskette Drive
- User Replaceable Hard Drive
- One Type II PCMCIA Slot
- Built-in Trackball

- NiMH Battery and AC Adapter
- Advanced Power Management with SMM
- One Parallel and One Serial Port
- External VGA and Keyboard Port
- MS DOS 6.2
- Weight: 3.9 lbs.
- Carrying Case

Monochrome SubNote

486SX-25 with 260 Mb HDD
#007342 **\$1299**

486DX-25 with 340 Mb HDD PCMCIA 9624 S/R Fax Modem
#007307 **\$1499**

Dual Scan Color SubNote

486SX-33 with 260 Mb HDD WFW 3.11
#007340 **\$1899**

486SX-33 with 340 Mb HDD WFW 3.11
#007341 **\$1999**

Policy: No service charge for credit card orders. Prices are subject to change. Repair or replacement of defective products is at MidWest Micro's discretion. We are not responsible for errors in typography and photography. Original shipping and handling fees, as well as return shipping charges, are non-refundable. There are no returns for credit after 30 days. Call or write MidWest Micro for more information on warranties and policies. All products are trademarks of their respective manufacturers. All registered and unregistered trademarks are the sole property of their respective companies.

**FLEX
ULTIMATE BUNDLE**

**FOR THOSE
WHO WANT
IT ALL!**

\$2995



FLEX VL486DX2-66MHz System

Intel 486™ DX2 66MHz • 8MB RAM
420MB HD w/128K Cache • 3.5" 1.44MB FD • 15" SVGA
1024x768 28 NI FLEXVISION Monitor • VLBus Video
w/1MB RAM • Enhanced Keyboard • Microsoft Mouse

SONY/Sound Blaster CD-ROM Bundle

Sony Double-Spin Internal CD-ROM Drive
Sound Blaster 16 Audio Board • 16-bit Stereo Sound
2 Speakers • Cables & Instructions • Up to 8 CD-ROM titles
(Ask your sales representative for available titles)

COLOR HP DeskJet 550C Printer Full Color • 3 ppm
300 dpi • Dual Ink Cartridge System • Prints up to 16.7 Million
Colors • Plain paper, Envelopes or Transparencies

Data Fax Modem 2400bps S/R Data • 9600 Send/4800 Receive Fax

Software & Accessories MS DOS 6.2 • Windows 3.1
Microsoft Works for Windows • Microsoft Money
3.5" Disks (Box of 10) • 6' Printer Cable • Disk Storage Box
6 Outlet Surge Protector • 11 Piece Tool Kit • Mouse Pad

3 Year Warranty

FLEX Express Parts Replacement

**PERFORMANCE
PACKAGE**

**IBM ValuePoint 486DX2-66MHz
COLOR HP DeskJet 550C Printer**

Two Great Names...One Great Price!

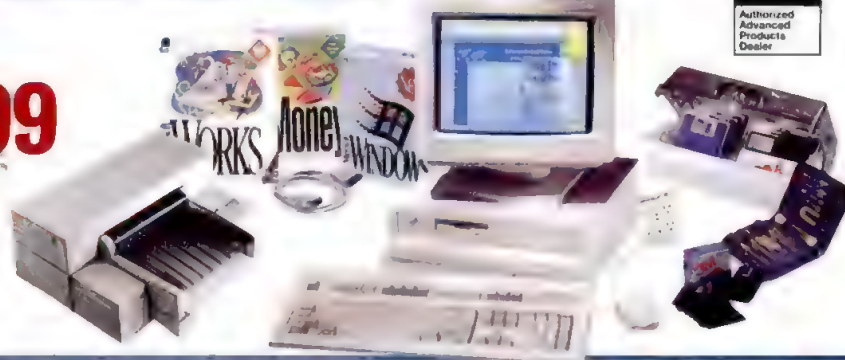
IBM® PS/ValuePoint Si System

IBM model 6381M50
4MB RAM (Maximum 64MB)
212MB Hard Drive
VESA Local Bus Video w/512K Memory
3.5" 1.44MB Diskette Drive
15" SVGA FLEXVISION.28 NI Color Monitor
Keyboard, Mouse
1 Year On-site Warranty, IBM HelpWare®

HP DeskJet 550C Printer 300 dpi, 3 ppm, water resistant ink,
feeds up to 100 sheets, 3 year warranty

Plus, Software and Accessories IBM DOS 6.1,
MS Windows™ 3.1, MS Works for Windows, MS Money,
6 Foot Printer Cable, Disk Storage Box, 6 Outlet Surge Protector,
11 Piece Tool Kit, Mouse Pad

\$2699



**hp HEWLETT®
PACKARD**
Authorized Dealer

Authorized
Advanced
Products
Dealer

**FLEX
VALUE SYSTEMS**

**NOW with 15" Monitor, Modem,
MS Works for Windows & MS Money**

3 VLB 32-bit slots 4 MB RAM
128K Cache • 3.5" 1.44MB Floppy Drive
VLB Video Accelerator Card w/ 1MB RAM
24/96 Data/Fax Modem • Desktop Case w/200W PS
15" SVGA Color Monitor (.28mm, 1024x768 NI)
Enhanced Keyboard • Genuine Microsoft Mouse
MS-DOS 6.2 • Windows 3.1
3 Year Warranty
FLEX Express Part Replacement

\$1399

Flex VL486SX-33 Intel™ 33 MHz; 486SX 250MB HD

Flex VL486SX2-50 Intel™ 50 MHz; 486SX2 With 270MB HD..... **\$1549**

Flex VL486DX2-50 Intel™ 50 MHz; 486DX2 With 270MB HD..... **\$1649**

Flex VL486DX2-66 Intel™ 66 MHz; 486DX2 With 420MB HD..... **\$1799**

IBM PS/ValuePoint™

Genuine Intel microprocessors,
4MB RAM (Max. 64MB), VLB
SVGA video: up to 1280x1024
resolution, One 3.5", 1.44MB FD,
101-key keyboard, IBM DOS 6.1,
Windows 3.1, 1 year on-site
warranty, 24-hour IBM HelpWare

* Monitor not included

Starting At...

\$899*

Model	Clock Speed	Hard Drive/ Ave. Access	Flex Part #	Flex Price*
PS/ValuePoint Si - SpaceSaver -				
512K Video RAM, 3 ISA Slots, (2) 3.5" & (1) 5.25" bays				
486SX 25 MHz	120 MB/15 ms	6381F30		'899
486SX 25 MHz	212 MB/13 ms	6381F50		'999
486DX 33 MHz	120 MB/15 ms	6381M30		'1249
486DX 33 MHz	212 MB/13 ms	6381M50		'1369
486DX2 66 MHz	212 MB/13 ms	6381W50		'1749
PS/ValuePoint Desktop - Includes 32-Bit VLB Slot, ZIFF socket, and is Pentium™				
Overdrive Upgradeable, 1MB Video RAM, 5 ISA Slots, (3) 3.5" & (2) 5.25" bays				
486SX 33 MHz	170 MB/14 ms	6384L40		'1349
486DX 33 MHz	212 MB/13 ms	6384N50		'1549
486DX 33 MHz	340 MB/14 ms	6384N70		'1699
486DX2 66 MHz	340 MB/14 ms	6384X70		'2149

TO ORDER, CALL...

USA FLEX

Code # PM05A4 471 Brighton Drive, Bloomingdale, IL 60108

Federal Express®
Delivery Service
Available



No Surcharge
On These
Credit Cards



1-800-333-4515

IBM and HelpWare are registered trademarks and PS/ValuePoint is a trademark of International Business Machines Corporation. Pentium is a trademark. Intel and the Intel Inside logo are registered trademarks of Intel Corporation. Hewlett Packard and the Hewlett Packard logo are registered trademarks of the Hewlett Packard Corporation.

Best Buy

FOR SYSTEMS!

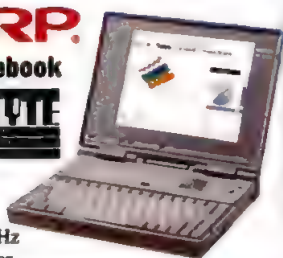
SHARP

Color LCD Notebook Computers



FREE
Bat. trackball - a790 Volar

- SL-enhanced 33MHz i486™DX Processor
- Built-in Power Management.
- 640X480 @ 256 Colors
- PCMCIA type II slot
- 200MB HD, 1.44MB FD



From **\$2599**
SH-PC8150T



Includes Data/Fax Modem

From **\$1299**
A433211

EPSON

ActionNote™ 4000

- 486SLC/33MHz, 80MB or 120MB Hard Drive
- 4 MB RAM
- PCMCIA Type II slot
- 7.5" mono. LCD display
- 64 gray scales
- 1.44 MB ext. FD
- 2-button Trackball
- 3.85 lbs.



A DeLIGHTful Deal
On A Subnotebook!

IBM® ThinkPad® 500

From **\$1599**

- 25% smaller than most notebooks
- 1.63" x 10.1" x 7.23"
- Only 3.8 lbs - w/battery
- High performance 486 SLC 50/25 MHz processor by IBM
- 1.44 MB ext. FD



- Leading edge PCMCIA technology
- TRACKPOINT II™ pointing device
- Energy-saving Auto Shutdown feature
- Up to 9 Hours battery life

COMPAQ

Special Purchase

"Factory-Reconditioned"
COMPAQ CONTURA NOTEBOOKS

Prices Start at...
\$999



Limited Quantity! Unbelievable Prices!
Fully Factory-Reconditioned
& Tested by Compaq Technicians!
All Models include
1 Year Compaq Factory Carry-in Warranty
(See available Models below)

Introducing
The **FASTEST**
Notebook Ever!

TI's TravelMate 4000E

WinDX4™ /75

From
TEXAS INSTRUMENTS

9.5" Active Matrix
455MB Hard Drive
\$4949



8.4" Active Matrix
340MB Hard Drive
\$4449

- Both models include:
- IntelDX4™/75 processor
 - 4MB RAM (Max. 20MB)
 - 1MB Video RAM

- Full-travel Keyboard
- Microsoft BallPoint®

New Lower Prices
on other
Award Winning
TI Notebooks!
See below for details.



SHARP

Color LCD Notebook Computers
200MB HD, 9.4" DualScan Color LCD.
SH-PC8150T**\$2399**
8.4" Active-matrix Color TFT LCD.
SH-PC8650T**\$2399**

EPSON

ActionNote 4000 Mono
80MB A433211 / 120MB A433221**\$1299**/**\$1349**
170MB A433241**\$1399**
ActionNote 4SLC2-50 Mono
120MB, W/2496 Data/Fax Modem A472211**\$1499**
180MB A472221**\$1499**
180MB, 2496 Data/Fax Modem A472221**\$1599**
ActionNote 500C Passive Matrix Color
120MB A475211 / 180MB A475241**\$1579**/**\$2069**
ActionNote 4SLC/33MHz - SPECIAL PRICING!
170MB A443771**\$1399**
ActionNote 700 Series
700 120MB, 9.5" Mono A478201**\$1899**
700 210MB, 9.5" Mono A478221**\$1999**
700C 210MB, 9.5" Color, A479221**\$2599**
700C 260MB, 9.5" Color, A479231**\$2849**
700Cx 210MB, 8.5" Active Matrix A480221**\$3229**

COMPAQ

Factory Reconditioned

CONTURA 386/25 25MHz 386SL
60MB 139400-004-R**\$999**
CONTURA 386/25C 25MHz 386SL
84MB 139410-004-R**\$1399**
CONTURA 425 25MHz 486SL
120MB W/ NiCad Battery 146500-003-R**\$1349**
120MB Hard Drive, As above W/ NiMH Battery,
PPS Window Works, Prodigy, WinMidi,
146500-003-R**\$1449**
LTE Lite/25C 25MHz 386SL Processor
120MB (Model 120 fw) 138250-004-R**\$1899**

TOSHIBA

T1910 Mono.
120MB PA1113U-M2A**\$1479**
200MB PA1114U-M2A**\$1699**
T1910CS Color Dual-Scan
120MB PA1113U-S2A**\$2069**
200MB PA1114U-S2A**\$2279**
T1950 9.5" mono.
120MB PA1115U-M2A**\$1879**
200MB PA1115U-M2A**\$2089**
T1950CS 9.5" Color -Passive
120MB PA1115U-S2A**\$2479**
200MB PA1115U-S2A**\$2689**
T1950CT 8.4" Color -Active,
120MB, PA1115U-T2A**\$2849**
200MB PA1115U-T2A**\$3129**
320MB PA1115U-T2A**\$4489**

T3400 Portege 8.4" Mono.
PA1116U-M9A**\$2229**
T3400CT Portege
7.8" Color Active Matrix
PA1116U-T9A**\$3449**



T4700CS Color Dual-scan Passive
200MB PA1156U-S2A**\$3599**
320MB PA1157U-S2A**\$4229**
T4700CT Color Active Matrix
200MB PA1158U-T2A**\$4679**
320MB PA1159U-T2A**\$4929**

NEW T4800CT Color Active Matrix
200MB PA1158U-T2A**\$4679**

T6600C CD-ROM ready
PA1609U-X7A**\$1899**
T6600C/CD Includes Int. CD-ROM
PA1609U-X8A**\$1899**

TEXAS INSTRUMENTS

TravelMate™ 486
Monochrome Notebooks
TravelMate 4000E WinSX/25
120MB HD 2581373-0001**\$1699**
TravelMate 4000 WinDX/25
120MB HD 2582390-0018**\$1999**
200MB HD 2582390-0018**\$2179**
TravelMate 4000/4000E WinDX2/50
200MB HD 2646615-0001**\$2429**
TravelMate™ 486
Color Notebooks
TravelMate 4000E WinSX/25
8.2" Advanced Passive Color, 120MB HD
2646692-0001**\$1829**
TravelMate 4000E WinDX2/40
8.2" Advanced Passive Color, 200MB HD
2581375-0001**\$2679**

TravelMate 4000E WinDX2/50
9.4" Dual Scan Color, 200MB HD
2646694-0001**\$2999**
TravelMate 4000E WinDX2/50
8.4" Active Matrix Color, 200MB HD
2581011-0001**\$3799**
NEW TravelMate 4000E WinDX4™/75
8.4" Active Matrix Color, 340MB HD
9793050-0001**\$4449**
NEW TravelMate 4000E WinDX4™/75
9.4" Active Matrix Color, 455MB HD
9792950-0001**\$4949**

TravelMate™ DeskTop Intelligent
Docking System
For TravelMates w/QuickPort connections.
2581447-0001**\$799**

IBM

IBM ThinkPad 500
85MB HD 260308N**\$1599**
170MB HD 260317N**\$1899**
Options (ThinkPad 500)
Portfolio case (holds system only) 59G7969 /45
Traveling Case (holds system & acc.)
59G7970**\$79**
NICAD battery 59G7977**\$179**
4MB Viking PCMCIA Memory 19098**\$29**
8MB Viking PCMCIA Memory 19099**\$49**

Software Special
With Purchase of ThinkPad 500
MS Windows 3.1 & MS Works for Windows**\$99**

NEC

VERSA 40EC 486DX2-40MHz,
120MB PC-440-1511**\$749**
VERSA 40EC 486DX2-40MHz,
250MB PC-440-1531**\$1149**
VERSA 50EC 486DX2-50MHz,
209MB PC-450-1521**\$1499**
VERSA 50EC 486DX2-50MHz,
340MB PC-450-1541**\$1799**

Special Offer

US Robotics WorldPort
PCMCIA Modem
14.4data/14.4 S/R Fax/Modem w/Software
368962**\$249**
*With purchase of any notebook with PCMCIA Type II Slot
Ask your sales Rep. for Details

ORDER INFORMATION: Minimum order \$80. Minimum shipping and handling per order \$11.95. MasterCard, Visa and Discover accepted for USA, Canada, APO, FPO and Puerto Rico. FLEXCARD accepted for continental USA only. A \$10 surcharge on credit card orders for APO, FPO and Puerto Rico. C.O.D. order under \$500.00, add \$5.00; over \$500.00, add \$10.00 check warranty charge. Call for special UPS Red/Blue C.O.D. rates. APO/FPO, add 5% to cover additional shipping and handling. Call for PAL rates. CORPORATE/GOVERNMENT ORDERS: Corporations need 1A1 or better and government agencies accepted on Net 30 terms with receipt of a valid purchase order. Leasing Plans available for qualified businesses only. RETURN PRODUCT INFORMATION: All returns must have prior authorization from our Customer Service Department (1-800-955-1488 or 1-708-351-7172 Mon. - Fri. 7:30 a.m. to 6 p.m. & Sat. 9 a.m. to 2 p.m. CT). All returns must be in as-shipped condition, with original packaging, including all warranty cards and manuals. Product Returns may be subject to a restocking charge. We will only accept returns on unopened and non-downloaded software. Software compatibility guaranteed only if we have downloaded it on your new FLEX system. Thirty (30) day money back guarantee applies to FLEX system only (does not include printers or other non-installed peripherals). We will not accept returns on laser printers if toner cartridge has been installed. All prices and specifications subject to change, without notice. Not responsible for typographical or printing errors. All trademarks and registered trademarks are of their respective holders. © 1994 USA FLEX.

(708) 582-6206 • FAX (708) 351-7204
Gov't 1-800-723-2280/Ed. 1-800-944-5588
Gov/Ved. FAX (708) 351-9871
Habla Español 1-800-723-5500 • (708) 582-6142
Verhandlungen in deutsch (708) 924-6680
(7:00 Uhr bis 15:00 Uhr/Midnight to 8:00 a.m. CT)
Customer Service 1-800-955-1488
(7:30 a.m. - 6:00 p.m. Mon.-Fri., Sat. 9 a.m. - 2 p.m. CT)

USA FLEX

1-800-333-4515
Open 24 Hours Monday - Friday
9 a.m. - 4 p.m. Sat. & Sun.

Code # PM05A4

CIRCLE 051 ON READER SERVICE CARD

**SONY And
CREATIVE**
CREATIVE LABS, INC.



Only...
\$299
SONYBLASTER (B)

Unbelievable
Offer!

**Sony CDU-33A
Double-Speed Internal Drive**
300KB/sec transfer, 350ms access,
64KB buffer
**Sound Blaster 16 Audio Board by
Creative Labs**
8-/16-bit stereo sampling & playback,
20-voice, 4-operator FM
synthesizer, stereo digital mixer, power
amplifier & expansion connector.
Speakers, cables & instructions

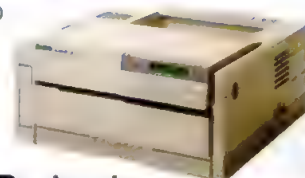


hp HEWLETT
PACKARD
Authorized Dealer

**NEW AT
USA FLEX!**

**Hewlett-Packard
LaserJet 4L Printer**

- 300-dpi with HP Resolution Enhancement Technology and Microfine Toner
 - 26 scalable fonts
 - **EconoMode Printing Saves Money** by Cutting Toner Use In Half
 - **Intelligent On/Off Save Electricity**
 - **Scalable & Rotatable Typefaces** with HP's enhanced PCL 5
 - 1 Year Warranty
- \$659**
BI-LASER4L



**Hewlett-Packard
LaserJet 4P Printer**

- 600-dpi with HP Resolution Enhancement Technology and Microfine Toner
 - 35 scalable fonts & 10 TrueType fonts
 - **EconoMode Printing Saves Money** by Cutting Toner Use In Half
 - **Intelligent On/Off Save Electricity**
 - **Custom Media Handling**
 - 250 Sheet Capacity
 - 1 Year Warranty
- \$959**
BI-LSR4P



**Introducing
The New DX Series
from MAG Innovision**

- MPR-II Certification
- "Green" Power Management
- DX15F 15" Color Monitor**
 - Non-glare, 28mm Dot Pitch
 - 1280x1024 NI @ 60 Hz
 - 80MHz Bandwidth
- DX17F 17" Color Monitor**
 - Non-glare, 28mm Dot Pitch
 - 1280x1024 NI @ 60 Hz
 - 100MHz Bandwidth

1 Year Warranty on Parts and Labor
& 2 Year Warranty on CRT



\$449
MAG-DX15F



\$699
MAG-DX17F

**NEW LOWER
PRICES**

NEC
Starting **\$309**
At...



NEC 15" MultiSync® 3V Excellent choice for small business and home office users
NEC SVGA 14" Color Perfect for word processing, spreadsheets, or databases in a DOS environment
MultiSync® 3FG, 4FG & 5FG
Energy Star compliant monitors consume less than 30 watts of power in monitor sleep mode. (5FG, 4FG only)
MultiSync® 5FG & 6FG Enhanced power saving features, OptiClear™ screen surface.

BOCA MODEMS

14.4K W/FAX Int/Ext.	'119/'149
14.4K Pocket W/FAX	'189
24/96 Data/Fax	'69
24 data, 96 S/R w/voice Int/Ext.	'85/'105
24 data, 96/48 S/R Int/Ext.	'39/'59

HAYES MODEMS

Accura™ 24 Int/Ext.	'65/'75
Accura 144+ fax144 Int/Ext.	'199/'229
Optima 144+ fax144 Int/Ext.	'369/'379
Optima 144+ fax Pocket Ed.	'299

**PRACTICAL PERIPHERALS
MODEMS**

14,400/14,400 V.32bis Pocket	'309
24/96 Data/Fax V.22bis Int/Ext.	'77/'97
2400/9600 Data/Fax Int/Ext.	'89/'109
14,400/14,400 V.32bis Int/Ext.	'169/'189
14,400/14,400 V.32bis PS/2 MicroChannel	'379
Practical FaxMe™	'119

INTEL MODEMS

144/144 Faxmodem Int/Ext.	'159/'179
24/96 Faxmodem Int/Ext.	'99/'119
SatisFAXtion 400 / 400e	'299/'349

US ROBOTICS MODEMS

Sportster 14.4 FAX Int/Ext.	'159/'179
Worldport 14.4 FAX	'239
Courier V.32 Turbo Int/Ext.	'359/'389
Courier V.32 Turbo Fax Int/Ext. / PS/2	'349/'399/'349

**COLORADO MEMORY
SYSTEMS TAPE BACK-UP**

Ask about special on tape caddy.

Jumbo 250 Int/Ext.	'169/'249
Jumbo Trakker 120MB	'219
Jumbo Trakker 250MB	'329
PowerTape™	
1100 Int/Ext. (525MB)	'679/CALL
2400 Int/Ext. (1.2MB)	'949/'1089
4000 Int/Ext. (2.0MB)	'1199/'1399
PowerDAT6000 Int/Ext. (4.0MB)	'1129/'1359

3M DATA CARTRIDGES

DC2000 40/80MB	'11.45 ea.
DC2120 120/250MB	'15.45 ea.
DC2120 Ximat (QIC-80)	'20.45 ea.
DC2120 Rhomat	'22.45 ea.
DC600A	'15.95 ea.
DC6150 250/500MB	'16.95 ea.
DC6250 250/500MB	'21.95 ea.
DC6525 350/700MB	'26.95 ea.

TRIPP LITE POWER PROTECTION

New Power Miser (\$5,000 Protection)	'59
New Super 7 (2 year warranty)	'19
ISOBAR® Surge Suppressors (\$10,000 Protection)	
Isobar 4/Isobar 6/Isobar 8	'46/'51/'59
(\$5,000 Protection)	'49
ISOBAR® Ultra Surge Suppress. (\$25,000 Protection) 4/6/8	'49/'59/'69
DataShield S100 Surge Suppressor (\$5,000 Protection)	'59
Isotel® Ultra Surge Suppress. (\$25,000 Protection) 6/8	'64/'74
ISOBAR® Command Console Plus (\$10,000 Protection)	'75

NOVELL NETWORKING

NetWare 3.12 (3.5" Disks)	
5 user NV-3.12-5-3	'579
10 user NV-3.12-10-3	'1299
25 user NV-3.12-25-3	'1899
50 user NV-3.12-50-3	'2579
100 user NV-3.12-100-3	'3699
NetWare 4.01 (CD-ROM)	
5 user NV-4.01-5CD	'849
10 user NV-4.01-10CD	'1899
25 user NV-4.01-25CD	'2849
50 user NV-4.01-50CD	'3749
NOVELL DOS 7 W/ Personal NetWare	'69
NOVELL Adapters by Microdyne	
NE2000plus Supports all cabling	'89
NE2000Plus Supports Twisted Pair	'79
NE2000plus-3 Coax & Twisted Pair	'99
NE3200 Supports Coax	'469
NE3200T Supports Twisted Pair	'469

CREATIVE LABS CD-ROM BUNDLES

Omni CD™ Internal	'199
Discovery CD 8 Internal	'279
Discovery CD 16 Internal	'309
Edutainment™ 16 Internal	'409
DigitalEdge CD™ Internal	'699

MEDIA VISION CD-ROM BUNDLES

Double Fusion LX	'299
Fusion Double CD 16 Internal	'329
Pro 16 Multimedia Int. System II	'489

ORCHID CD-ROM BUNDLES

Multimedia Kit	'439
----------------	------

AZTECH CD-ROM BUNDLES

Sound Galaxy Double-Speed Pro 16 Multimedia Kit	'349
---	------

MITSUMI CD-ROM DRIVES

FX0001 Internal	'179
-----------------	------

TOSHIBA CD-ROM DRIVES

XM4101 Internal	'209
XM13401 Internal	'319
XM13401 External	'429

NEC CD-ROM DRIVES

MultiSpin 3Xe External	'559
MultiSpin 3Xi Internal	'469
MultiSpin 3Xp Personal	'429

CHINON CD-ROM DRIVES

535 Internal	'325
535 W/ SCSI I/F card Internal	'349
535 W/ SCSI I/F card External	'429

CREATIVE LABS SOUND CARDS

Sound Blaster Value Edition	'55
Sound Blaster Pro Value Edition	'75
Sound Blaster 16 AWE32	'285
Sound Blaster 16 SCSI-2	'165
Sound Blaster 16 SCSI-2 W/ASP	'195
Sound Blaster 16 MulticD	'135
Sound Blaster 16 MulticD W/ASP	'165
Wave Blaster	'175
Voice Assist	'55

AZTECH SOUND CARDS

Sound Galaxy Nx II Extra	'85
Sound Galaxy Nx Pro Extra	'95
Sound Galaxy Basic 16	'105
Sound Galaxy Pro 16	'135

MEDIA VISION SOUND CARDS

Pro Audio 16 Basic	'99
Pro Audio Spectrum 16	'125
Pro Audio Studio 16	'155

TO ORDER, CALL...

Best Buy

FOR PERIPHERALS!

**HEWLETT®
PACKARD**
Authorized Dealer

New HP DeskJet 520 Printer

- 600x300 dpi • Up to 3 ppm
- Improved water-resistant ink for smudgeproof printing
- Print up to 256 levels of gray
- 6 typefaces, plus 14 TrueType scalable fonts

\$289
C2170A

HP DeskJet 310 Printer

- 300 dpi • Up to 3 ppm
- Over 16 million colors capable W/ kit (depending on S/W)
- 84 typeface, style & size combinations
- PCL Level 3 w/ extensions
- Weights 4.3 lbs. 12" x 2.5" x 7.75"

\$299
C2621A

HP DeskJet 500C Printer - C/LOR

- 300 dpi output
- Single inkjet cartridge system
- Prints up to 16.7 million levels of color

\$389
B1-C2114A

New HP DeskJet 560C Printer - C/LOR

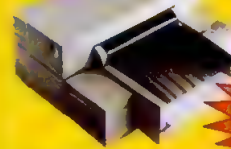
- 600x300 dpi • Up to 3 ppm
- Dual inkjet cartridge system
- 6 built-in typefaces, plus 14 TrueType scalable fonts

\$569
C2168A

FLEX SPECIAL on Hewlett-Packard DeskJet 550C Printer

HP's high-quality twin-cartridge black and color printer

\$429
C2121A



Order Today!
Quantities Limited

- 300 dpi Laser Quality
 - Dual inkjet cartridge system for simultaneous true black and color printing
 - Up to 16.7 million colors
 - Feeds up to 100 sheets (letter or legal)
 - 3-Year Warranty-the longest in the industry
- Color ink cartridge 51625A\$29
Black cartridge 51626A\$25

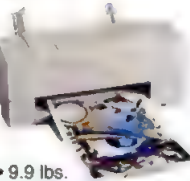
Canon

Canon BJC-600 Color Bubble Jet Printer

Finalist in PC Magazine's
10th Annual Technical
Excellence Awards.

- Narrow carriage
- 64-nozzle x 4 print heads
- 360 dpi • 60KB buffer
- 7 fonts
- 340 cps (20 cpi)
- Parallel I/F
- 100-sht. sheet feeder
- Win. 3.1 & 3.0 drivers.
- 2 year limited warranty • 9.9 lbs.

\$589
B1-BJC600



EPSON

Epson® Stylus 800 Ink Jet Printer

\$249*
B1-EPS800

- MACH ink jet tech.
- Crisp, 360 dpi
- Up to 225 cps LQ
- 7 LQ & 4 scalable fonts
- 100 sheet paper tray
- 2 year limited warranty
- W/ Toll-Free support hotline from Epson

Additional Black Ink Cart. B2-S020025\$18
*Your cost after \$25 mail-in rebate. Expires 5/30/94

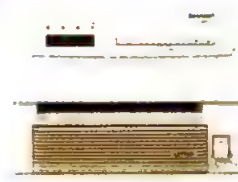


SHARP.

JX-9400 Laser Printer

\$479
SH-JX9400

- Compact design
- Footprint of only 1.3 sq. feet
- 6 ppm at 300 dpi
- 512K exp. to 4.5MB
- Virtually silent with Sharp's unique "Sleep" mode
- 5 printer emulations, including HP PCL 4
- Built-in 250-sheet letter cassette



IBM/LEXMARK PRINTERS

Lexmark WinWriter 600	\$1199
LaserPrinter 4039 10R	\$1349
LaserPrinter 4039 12R	\$1699
LaserPrinter 4039 10D	\$1849
LaserPrinter 4039 12L	\$2449
LaserPrinter 4039 16L	\$2749
LaserPrinter 4037 5E	\$659
Ink Jet 4076 ExecJet II	\$279
PS4079 Color	\$2499
2380 Plus/2381 Plus	\$309/\$439
2390 Plus/2391 Plus	\$329/\$439

EPSON PRINTERS

LASER PRINTERS

Action Laser 1000	\$599
Action Laser 1500	\$649
Action Laser 1500-II	\$719

EPSON DOT MATRIX PRINTERS

LX-810	\$184	LQ-870	\$439
AP 3250	\$172	LQ-1170	\$598
AP 3260	\$198	LQ-2550 Clr.	\$899
LQ-570+	\$239	DFX-5000	\$1319
FX-870	\$268	DFX-8000	\$2248
FX-1170	\$349	Stylus 300	\$229
LQ-1070+	\$364	Stylus 800	\$249*

*After \$25 mail-in rebate. Ends 5-30-94.

CANON PRINTERS

BUBBLE JET PRINTERS

BJ-105X Portable	\$259
BJ-200e Narrow Carriage	\$289
BJ-230 Wide Carriage	\$389
BJC-600 Color	\$589
BJC-800 Color	\$1499
BJC-820 Color	\$1829

LASER BEAM PRINTERS

LBP-430 / LBP-860	\$589 / \$1379
-------------------	---------------------

PANASONIC PRINTERS

LASER PRINTERS

KX-P4400	\$549	KX-P4440	\$999
KX-P4410	\$529	KX-P5400	\$799
KX-P4430	\$859		

DOT MATRIX PRINTERS

KX-P1150	\$129	KX-P1624	\$389
KX-P2023	\$179*	KX-P3123	\$249
KX-P2123	\$239	KX-P3124	\$319
KX-P2124	\$309	KX-P3624	\$399
KX-P2180	\$175		

*After \$20 mail-in rebate. Ends 4-30-94.

NEC PRINTERS

Silentwriter Model 610	\$699
Silentwriter 95f	\$899
Silentwriter 95fx	\$1099
Silentwriter Model 1097	\$1379
Silentwriter SuperScript 610	\$569

TEXAS INSTRUMENTS

microWriter	\$619
microWriter PS23	\$679
microWriter PS65	\$939
microMarc™	\$249*
microLaser Pro 600 PS23	\$1309**
microLaser Pro 600 PS65	\$1529
Pro 600 imaging cartridge	\$159

**After \$30 mail-in rebate.

**After \$60 mail-in rebate. Ends 6-31-94.

SHARP PRINTERS

JX-9400 / JX-9460PS	\$479/\$959
JX-9460PS W/ RISC Processor	\$1249

CTX MONITORS

14" 6439	\$219
14" 6468 / 14" 6468GM	\$259 / \$279
14" 1451 / 14" 1451GM	\$275 / \$299
14" 1462GM	\$329
15" 1562GM / 15" 1565GM	\$389 / \$399
17" 1785GM	\$765

FLEXVISION MONITORS

14" VGA Mono	\$119
14" 28 dp, 1024x768 NI	\$265
15" 28 dp, 1024x768	\$339

MAG MONITORS

14" LX1450LG	\$299
15" LX1564LG	\$399
15" DX15F / 15" MX-15F-L	\$449 / \$499
17" DX17F / 17" MX17F-L	\$699 / \$879
17" MX17G	\$929

MAGNAVOX MONITORS

14" Paper White Mono	\$125
14" CM2089	\$259
14" CM2099	\$265
20" 20CM164	\$1159

NEC MONITORS

14" SVGA	\$309	17" 5FGe	\$999
15" 3V	\$469	17" 5FGp	\$1099
15" 3FGe	\$589	21" 6FGp	\$1999
15" 4FGe	\$619		

PHILIPS MONITORS

15" 1520AS	\$449
17" 1720DC	\$999
21" 2120DC	\$2299

SONY MONITORS

14" CPD-1430	\$549
14" CPD-1730	\$1079
17" GDM-17SE1	\$1199
20" GDM-2036S	\$2969
20" GDM-2038	\$3399

ATI VIDEO CARDS

GRAPHICS ULTRA+ 2MB	\$239
GRAPHICS ULTRA™ PRO 2MB ISA/VLB/EISA	\$359/\$359/\$399

DIAMOND VIDEO CARDS

SpeedStar PRO 1MB ISA/VLB	\$109/\$115
Stealth 24 1MB ISA/VLB	\$159/\$165
Stealth PRO 1MB ISA/VLB	\$219/\$229
Stealth PRO 2MB ISA/VLB	\$289/\$299
Viper VLB 2MB	\$389

HERCULES VIDEO CARDS

Dynamite Pro ISA 1MB/2MB	\$159/\$199
Dynamite Pro VLB 1MB/2MB	\$159/\$199
Graphite Pro ISA 1MB/2MB	\$249/\$379
Graphite Pro VLB 1MB/2MB	\$249/\$379
Graphite 2MB Upgrade Kit	\$159

ORCHID VIDEO CARDS

Fahrenheit 1280+ 1MB ISA/VLB	\$139/\$159
Fahrenheit 1280+ 2MB VLB	\$199
Fahrenheit VA 1MB ISA (only)	\$169
Celsius VLB 1MB/2MB	\$199/\$249

ORDER INFORMATION: Minimum order \$80. Minimum shipping and handling per order \$11.95. MasterCard, Visa and Discover accepted for USA, Canada, APO, FPO and Puerto Rico. FLEXCARD accepted for continental USA only. A \$10 surcharge on credit card orders for APO, FPO and Puerto Rico. C.O.D. order under \$500.00, add \$5.00; over \$500.00, add \$10.00 check/warranty charge. Call for special UPS Red/Blue C.O.D. rates. APO/FPO add 5% to cover additional shipping and handling. Call for PAL rates. CORPORATE/GOVERNMENT ORDERS: Corporations rated 1A1 or better and government agencies accepted on Net 30 terms with receipt of a valid purchase order. Leasing Plans available for qualified businesses only. RETURN POLICY/PRODUCT INFORMATION: All returns must have prior authorization from our Customer Service Department (1-800-955-1488 or 1-708-351-7172 Mon. - Fri. 7:30 a.m. to 6 p.m. & Sat. 9 a.m. to 2 p.m. CT). All returns must be in as-shipped condition, with original packaging, including all warranty cards and manuals. Product Returns may be subject to a restocking charge. We will only accept returns on unopened and non-downloaded software. Software compatibility guaranteed only if we have downloaded it on your new FLEX system. Thirty (30) day money back guarantee applies to FLEX system only (does not include printers or other non-installed peripherals). We will not accept returns on laser printers if toner cartridge has been installed. All prices and specifications subject to change, without notice. Not responsible for typographical or printing errors. All trademarks and registered trademarks are of their respective holders. © 1994 USA FLEX.

(708) 582-6206 • FAX (708) 351-7204
Gov't 1-800-723-2260/Ed. 1-800-944-5555
Gov't/Ed. FAX (708) 351-9871
Hable Español 1-800-723-5500 • (708) 582-6142
Verhandlungen in deutsch (708) 924-6680
(7:00 Uhr bis 15:00 Uhr/Midnight to 9:00 a.m. CT)
Customer Service 1-800-955-1488
(7:30 a.m. - 6:00 p.m. Mon.-Fri., Sat. 9 a.m. - 2 p.m. CT)

USA FLEX

1-800-766-1940
Open 24 Hours Monday - Friday
9 A.M. - 4 P.M. Sat. & Sun.

Code # PM05A4

CIRCLE 065 ON READER SERVICE CARD

Best Windows Workstation.

PC Magazine Chooses Comtrade.

In Windows-shattering competition, Comtrade 486/66 system stood head & shoulders above 191 others to win the coveted PC Magazine's Editors Choice award for Best Windows Workstation, December 7, 1993. "The Comtrade EISA VL-Bus struck us as a fully optimized Windows workstation that led the entire testing group in Windows-based testing," says PC Magazine. This is the fifth time in recent months that lightning has struck at the same place - Comtrade.

Different Comtrade systems have also won PC World '94 Best Buy, Computer Shopper's Top Ten Best Buy, PC Sources Best Buy and Computer Buyer's Guide & Handbook Best Buy.



December 7, 1993
Comtrade EISA Professional



January, April 1994
Comtrade VL-Bus Best Buy

The Perfect MultiMedia

■ VESA/PCI Local Bus MultiMedia

Local Bus systems' 32-bit bus bandwidth make them 8 times faster than a regular ISA machine. This extra power along with multimedia's graphics intensive software make them the perfect match. So, make the intelligent choice. Buy Comtrade's Award Winning local bus system bundled with our exciting multimedia package.

■ Double Speed CD-ROM Drive Standard

Every MultiMedia System offered by Comtrade comes standard with a double-speed CD-ROM drive which supports both multisession Kodak Photo CDs and standard audio stereo CDs.

■ 16-Bit Stereo Sound Card

The Award Winning ProAudio Spectrum 16 stereo sound card includes stereo outputs, amplifier, and an OPL3 FM synthesizer with 20 stereo voices. In addition, it is the most widely supported 16-bit sound card in the industry.

■ Orchid GameWave 32: True DSP Sound

This card includes all the ProAudio Spectrum 16 features. In addition, it also has a 20MIPS DSP (digital signal processor), built-in General MIDI, and Roland MT-32 MIDI to support the 2MB on board Wavetable (which contains over 200 recorded instruments for true-to-life sounds). Upgrade from Spectrum 16 Add \$50

MultiMedia Best Buy

- Hottest 486 VL-Bus or 64-bit Pentium™ PCI System
- Double Speed CD-ROM Multisession Drive
- MediaVision ProAudio Spectrum 16 Sound Card
- 2 Amplified Stereo Hi-Fi Speakers & 4 CD Titles
 - 8MB RAM & 128K Cache SRAM
 - One Floppy Drive (3.5" or 5.25")
- VESA Local Bus IDE Hard Disk Controller
- 425MB 12ms IDE Drive with 128K Cache
- VL-Bus ThunderPro (1MB) Graphics Accelerator (Up to 1280x1024 & up to 16.7 million Colors)
- 15" Flat Screen .28mm Non-Interlaced SVGA Monitor (36% larger edge to edge display)
 - 2 Serial, 1 Parallel & 1 Game Ports
- Enhanced 101-key Keyboard & Serial Mouse
- Anti-Virus MS-DOS 6.2 & Windows 3.11

486/33 DX \$1995
486/66 DX2 \$2095
486/100 DX4 \$2425
Pentium/66 \$2845

- Upgrade to Larger 530MB IDE Drive Add \$120
- Diamond Stealth 32 (2MB), 26 WinMark 4.0 Add \$120

EISA / PCI SCSI-2

- Hottest 486 EISA or 64-bit Pentium™ PCI System
- 256K Ultra-Fast Write-Back Cache SRAM
- 8MB RAM & Expandable to 128MB
 - One Floppy Drive (3.5" or 5.25")
- VL-Bus/PCI ASPI SCSI-2 Hard Disk Controller
- 340MB 12ms SCSI-2 Drive with 128K Cache
- VL-Bus/PCI ThunderPro (1MB) Graphics Accelerator (Up to 1280x1024 & up to 16.7 million Colors) (Up to 38 Million WinMark 3.11 Performance)
- 15" Flat Screen .28mm Non-Interlaced SVGA Monitor (36% larger edge to edge display)
 - 2 Serial, 1 Parallel & 1 Game Ports
 - Enhanced 101-key Keyboard
 - Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.2 & Windows 3.11

486/33 DX \$1825
486/66 DX2 \$1945
486/100 DX4 \$2265
Pentium/66 \$2625

- Upgrade to larger 540MB SCSI-2 Drive Add \$120
- Double Speed CD-ROM Drive Add \$170

PCI Dream Machine

- Latest Intel PCI Technology with 3 PCI Slots
- 256K Ultra-Fast Write-Back Cache SRAM
- 8MB RAM & Expandable to 128MB
 - Double-Speed CD-ROM Drive
 - One Floppy Drive (3.5" or 5.25")
- PCI Local Bus IDE Hard Disk Controller
- 530MB 9ms IDE Drive with 256K Cache
- PCI Genoa Phantom W32P (2MB) Graphics Accelerator (Up to 1280x1024 & up to 16.7 million Colors)
- 15" Flat Screen .28mm Non-Interlaced SVGA Monitor (36% larger edge to edge display)
 - 2 Serial, 1 Parallel & 1 Game Ports
 - Enhanced 101-key Keyboard
 - Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.2 & Windows 3.11

486/66 DX2 \$2275
486/100 DX4 \$2575
Pentium/66 \$2895
Pentium/90 \$3295

- PCI SCSI-2 Controller & 540MB Drive Add \$90
- Diamond Stealth 32 (2MB); faster than Viper Add \$40

ATI Ultra XLR 16

WinMark 4.0
Intel Pentium PCI 66 MHz

Diamond Stealth 64

32

Matrox MGA II

26

Popular Options:

- Double-Speed CD-ROM Drive \$170
- 14400 bps V.32 FaxModem \$120
- Archive 250MB Tape Backup \$140

- Upgrade to Diamond Stealth 32 (2MB) \$120
- Upgrade to Diamond Stealth 64 (2MB) \$260
- Upgrade from 15" to 17" Monitor \$350
- ProAudio Spectrum 16 Sound Card \$130
- 16-Bit Ethernet 10-BaseT Card \$70

Double Speed MultiMedia.



VESA Local Bus WinStation

- OverDrive Socket for Pentium™ 12.5" Technology
 - 26K Cache SRAM & Expandable to 256K
 - 4MB RAM & Expandable to 64MB
 - One Floppy Drive, 3.5" or 5.25"
 - VESA Local Bus IDE Hard Disk Controller
- 210MB 13ms IDE Drive with 64K Cache
- VL-Bus ThunderPro (1MB) Graphics Accelerator (Up to 1280x1024 & up to 16.7 million Colors) (Up to 38 Million Winmark 3.11 Performance)
- 14" Non-Interlaced .28mm 1024x768 Monitor (12% larger edge to edge display)
 - 2 Serial, 1 Parallel & 1 Game Ports
 - Enhanced 101-key Keyboard
 - Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.2 & Windows 3.11

486/33 SX \$1175

486/33 DX \$1345

486/66 DX2 \$1465

486/100 DX4 \$1795

- Double Speed CD-ROM Drive Add \$170
- 15" Flat Screen Non-Interlaced Monitor Add \$85

VESA Local Bus Best Buy

- OverDrive Socket for Pentium™ 12.5" Technology
 - 26K Cache SRAM & Expandable to 256K
 - 8MB RAM & Expandable to 64MB
 - One Floppy Drive, 3.5" or 5.25"
 - VESA Local Bus IDE Hard Disk Controller
- 425MB 12ms IDE Drive with 128K Cache
- VL-Bus ThunderPro (1MB) Graphics Accelerator (Up to 1280x1024 & up to 16.7 million Colors) (Up to 38 Million Winmark 3.11 Performance)
- 15" Flat Screen .28mm Non-Interlaced SVGA Monitor (36% larger edge to edge display)
 - 2 Serial, 1 Parallel & 1 Game Ports
 - Enhanced 101-key Keyboard
 - Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.2 & Windows 3.11

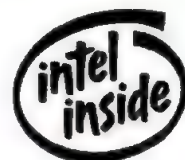
486/33 DX \$1675

486/66 DX2 \$1795

486/100 DX4 \$2095

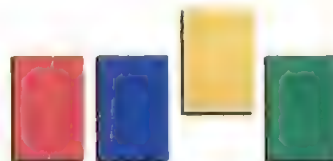
P5/66 PCI \$2525

- Change Any 486 VL-Bus to PCI Configuration Add \$120
- Diamond Stealth 32 (2MB); faster than Viper Add \$120



Peace of Mind

- 30-Day Money Back Guarantee
- Three-year System Warranty
- One-year On-site Service (optional)
- Toll-free Technical Support



COMTRADE

"Where Quality is Everything"

Prices do not include shipping. Shipping and opened software are not refundable. Three year warranty applies to Comtrade manufactured components only. - 18 months warranty on monitor & hard drive. The Intel Inside Logo, Pentium, OverDrive, and Intel DX4 are trademarks of Intel Corporation. International (818) 961-6688

ANY
VL-Bus to PCI Add \$120

CIRCLE 316 ON READER SERVICE CARD

800.969.2123

15314 East Valley Blvd • City of Industry, CA 91746
Fax: (818) 369-1479 Mon-Fri: 7AM-7PM, Sat: 9AM-6PM

Before You Buy

**TI
AST
NEC
IBM
COMPAQ
TOSHIBA**

Shop and Compare

Don't Settle for Less

PCs Compleat	Supplier 1	Supplier 2	Supplier 3
Guaranteed Lowest Price	YES		
The Best Brand Names	YES		
30-day Money Back Guarantee	YES		
Never a Restocking Fee	YES		
30-day Price Protection	YES		
PC Computing Five Star Award	YES		
Lifetime Toll-Free Technical Support	YES		
FREE Hardware Configuration	YES		
FREE Software Installation	YES		
Same Day Shipment	YES		
Pre-installed Software Discount	YES		
All Major Credit Cards Accepted	YES		
Never a Hidden Surcharge	YES		
\$4.95 Shipping on Most Peripherals	YES		
Compaq Authorized for Direct Marketing	YES		
90 Days Same As Cash	YES		
Low Cost Business Leases	YES		
Volume Purchase Agreements	YES		
FREE Asset Tagging	YES		
Customer Satisfaction Is Top Priority	YES		



PCs Compleat is the proud recipient of PC Computing magazine's highest Five Star rating for service and overall performance in its listing of the nation's leading direct sellers.

PCs COMPLEAT
THE BEST: BRANDS · PRICE · DELIVERY · SERVICE

Open 24 hours Weekdays
Weekends & Holidays 10 A.M. - 8 P.M.

CALL TODAY!

800-775-4727

COMPAQ

Processor	Hard Drive	Price*
486SX/33	120MB	\$1109
486SX/33	240MB	\$1259
486DX/33	240MB	\$1469
486DX/33	340MB	\$1619

Lease for \$50/mo.

*Monitors sold separately

Centura 4/25

Screen	Hard Drive	Price
Mono	209MB	\$2199
Dual Scan	209MB	\$2319
Active Matrix	209MB	\$3449

Lease for \$81/mo.

\$1989*



Hard Drive	Model	Price
120MB	24/96	\$1519*
120MB	14.4/14.4	\$1629
170MB	24/96	\$1719
170MB	14.4/96	\$1629

Lease for \$56/mo.

Z-STAR 433VL

Screen	Hard Drive	Price
Mono	170MB	\$1659
Dual Scan	200MB	\$2349

Lease for \$60/mo.

\$1519*

LEADING EDGE

Processor	Hard drive	Price
486SLC33	120MB	\$779*
486SX/25	170MB	\$919
486SX/33	170MB	\$1009
486DX/33	260MB	\$1249
486DX/33MT	260MB	\$1309
486DX2/66	345MB	\$1699
486DX2/66MT	345MB	\$1839

*VGA color monitors begin at \$209.99

\$779*



- ▲ 486SX/25 processor
- ▲ Accelerated local bus graphics
- ▲ PCMCIA Type III slot

Screen	Model	Hard Drive	Price
Mono	123W	120MB	\$1449*
Mono	173W	170MB	\$1539
Dual scan	123W	120MB	\$2279
Dual scan	173W	170MB	\$2399
Active matrix	173W	170MB	\$2899

Lease for \$53/mo.

\$1449*



Model	Hard Drive	Price*
4/25 Model 123W	120MB	\$949
4/33 Model 123W	120MB	\$1229
4/33 Model 173W	170MB	\$1299
4/33 Model 213W	210MB	\$1539
4/66d Model 213W	210MB	\$1979

*Monitors sold separately

Lease for \$50/mo.

\$949*

Canon

- ▲ 2 PCMCIA Type II Slots
- ▲ Built-in Inkjet printer
- ▲ 360dpi resolution
- ▲ 9.5" Dual Scan STN color

Processor	Hard drive	Price
486SX/25	120MB	\$2839*
486SX/25	200MB	\$3169

\$2839*



Concerto

Concerto

- ▲ 9.5" mono display
- ▲ 2 PCMCIA Type II slots
- ▲ Integrated, detachable keyboard

Processor	Hard Drive	Price
486SL/25	120MB	\$1989*
486SL/25	250MB	\$2179
486SL/33	250MB	\$2369

Lease for \$73/mo.



Bravo LC 4/100t

- ▲ Intel DX4, 100MHz Processor
- ▲ 16KB internal cache
- ▲ 8MB RAM exp. to 64MB
- ▲ 270/540MB hard drive

Hard Drive	Model	Price
270MB	4/100t 273W	\$2339*
540MB	4/100t 273W	\$2719

*Monitors sold separately
AST and AST logo registered trademarks of AST Research, Inc

\$2339*



RAM	Desktop Systems	Price
8MB	20M-Wm	\$2149*
16MB	20M-Wm	\$2479

Lease for \$79/mo.

ISA/EISA	Tower Systems	Price
ISA	20M-Wm	\$2479
ISA	60M-Wm	\$2699
EISA	60M-Wm	\$3099

Includes 16MB RAM
15" SVGA color monitor \$399.99

\$2149*



Bravo NB

PowerExec

Model	Screen	Price
4/25SL Model 203/W	Mono	\$1979
4/25SL Model 203/W	Active color	\$3699
4/33SL Model 203/W	Mono	\$2259
4/33SL Model 203/W	Active color	\$3899
4/33SL Model 343/W	Active color	\$4299

Lease for \$73/mo.

AST and AST logo registered trademarks of AST Research, Inc



Model	Hard Drive	Price*
4/25 Model 123W	120MB	\$949
4/33 Model 123W	120MB	\$1229
4/33 Model 173W	170MB	\$1299
4/33 Model 213W	210MB	\$1539
4/66d Model 213W	210MB	\$1979

*Monitors sold separately

Lease for \$50/mo.

\$949*



Bravo LC

Bravo MT

Model	Hard Drive	Price*
4/33 Model 3	Optional	\$1239
4/33 Model 173W	170MB	\$1499
4/33 Model 343W	340MB	\$1979
4/66d Model 3	Optional	\$1659
4/66d Model 173W	170MB	\$1929
4/66d Model 343W	340MB	\$2399

*Monitors sold separately

Lease for \$50/mo.



Notejet

Printers

BJ10sx-portable, 110cps, 3.7lbs	\$259.99
BJ200e, desktop, 248cps	\$299.99
BJ230, 11"x17" capacity	\$419.99
BJC600, Color inkjet, 360dpi	\$589.99
LBP-860, 8PPM, 600dpi	\$1389.99

2-year warranty included

Compleat Your System With These Great Peripherals

DoubleCase Carrying Cases

DoubleCase NB-1000S	\$49.99
DoubleCase SL-10 Saddlebag	\$39.99
DoubleCase NB-3000	\$109.99
DoubleCase NB-4000	\$129.99
DoubleCase NB-5000	\$149.99

Maxtor

PCMCIA, 105MB Drive, Type III	\$469.99
DeskRunner, Drive Bay Adapter	\$139.99
130MB IDE Drive	\$199.99
245MB IDE Drive	\$249.99
345MB IDE Drive	\$309.99

U. S. Robotics

Sportster Ext 14.4/14.4 Fax	\$179.99
Sportster Int 14.4/14.4 Fax	\$159.99
Sportster Ext 96/96 Fax	\$159.99
Sportster Int 96/96 Fax	\$139.99
WorldPort PCMCIA 14.4/14.4	\$269.99

New Media

Visual Media SCSI PCMCIA Adapter	\$219.99
WAVjammer PCMCIA sound card	\$279.99
BusToaster PCMCIA SCSI Adapter	\$269.99

Angia

SafeJack 19.2/14.4	\$289.99
14.4/14.4 PCMCIA	\$259.99
14.4/14.4 16mm for Toshiba	\$299.99
14.4/14.4 for Compaq	\$349.99
24/96 for Compaq	\$149.99

Pilceon

14.4/14.4 PCMCIA w/SmartConnect	\$289.99
96/96 PCMCIA	\$259.99
24/96 PCMCIA	\$179.99
24/96 for Compaq	\$99.99
96/96 for Compaq	\$329.99
14.4/14.4 for Compaq	\$359.99



OL400e

\$499.99

- 4PPM
- 300dpi resolution
- Energy Star

OKIDATA



Toshiba Direct

NEW!

Portege T3400

- ▲ Ultra-portability at only 4.1lbs
- ▲ 486SX/33 processor
- ▲ 120MB hard drive
- ▲ 4MB RAM, expandable to 20MB
- ▲ PCMCIA Type II slot
- ▲ External 3.5" disk drive
- ▲ Integrated AccuPoint pointing device

Screen	Price
Monochrome	\$2259
Active Color	\$3469

Lease for \$82./mo.

TT3400CT



T1950



T1910/1950

- ▲ 4MB RAM, expandable to 20MB
- ▲ 9.5" display
- ▲ Type III PCMCIA slot
- ▲ 82-key keyboard
- ▲ MS-DOS, Windows 3.1
- ▲ Ballpoint mouse with Quickport
- Enhanced power management

Model	Processor	Screen	Hard Drive	Price
T1910	486SX/33	Monochrome	120MB	\$1499
T1910	486SX/33	Dual scan color	120MB	\$2099
T1910	486SX/33	Dual scan color	200MB	\$2329
T1950	486DX2/40	Monochrome	200MB	\$2099
T1950	486DX2/40	Dual scan color	200MB	\$2719
T1950	486DX2/40	Active color	200MB	\$3069
T1950	486DX2/40	Active color	320MB	\$3399

Lease for \$55/mo

T4700/T4800

- ▲ 8MB RAM, expandable to 24MB
- ▲ Brilliant 9.5" display with local bus video
- ▲ 2 PCMCIA slots (Type II, Type III)
- ▲ Microsoft Sound System, built-in microphone, audio out port
- ▲ MS-DOS, UltraFont, Indeo video compression software, Windows 3.1 (T4700)/Windows for Workgroups 3.11 (T4800)

Model	Processor	Screen	Hard Drive	Price
T4700	486DX2/50	Dual scan color	200MB	\$3999
T4700	486DX2/50	Dual scan color	320MB	\$4329
T4700	486DX2/50	Active color	200MB	\$4599
T4700	486DX2/50	Active color	320MB	\$4949
T4800	486DX4/75	Active color	500MB	\$5619

Lease for \$147/mo

T4700



Hewlett Packard Power

DeskJet/DeskWriter 310

- ▲ High quality 3 PPM printing
- ▲ Excellent portability - only 4.3 lbs.
- ▲ Low cost optional color kit
- ▲ Optional 60 page sheet feeder
- ▲ Select DeskJet for PCs and DeskWriter for Macintosh
- ▲ 1-Year warranty

DeskJet 310	\$299.99
DeskWriter 310	\$299.99
60 sheet feeder f/310	\$69.99
Battery pack f/310	\$34.99
Color Kit f/310	\$24.99
Battery recharger f/310	\$69.99



**HEWLETT
PACKARD**

Authorized Direct Reseller



DeskJet 310

DeskJet 500C

- ▲ Exceptional color printing for Windows
- ▲ Letter-quality 300dpi color printing
- ▲ Up to 7PPM color print speed
- ▲ 100 Sheet feeder for versatile paper handling
- ▲ Parallel & Serial interfaces
- ▲ 3 year warranty

DeskJet 500C	\$389.99
Black ink cartridge	\$24.99
Color ink cartridge	\$24.99
256kb memory upgrade	\$129.99

DeskJet/DeskWriter 520

- ▲ Sharp, 600 dpi "laser-like" print quality
- ▲ Resolution Enhancement Technology for smooth, crisp text and graphics
- ▲ Compact desktop package
- ▲ Select DeskJet for PCs and DeskWriter for Macintosh
- ▲ 3-Year warranty

DeskJet 520	\$299.99
DeskWriter 520	\$299.99

DeskJet/DeskWriter 560C

- ▲ Color 600 dpi "laser-like" print quality
- ▲ ColorSmart technology
- ▲ Resolution Enhancement Technology for smooth, crisp text and graphics
- ▲ Select DeskJet for PCs and DeskWriter for Macintosh
- ▲ 3-Year warranty

DeskJet 560C	\$579.99
DeskWriter 560C	\$579.99

CIRCLE 092 ON READER SERVICE CARD

PCs COMPLEAT

THE BEST: BRANDS · PRICE · DELIVERY · SERVICE

Open 24 hours Weekdays
Weekends & Holidays 10 A.M. - 8 P.M.

CALL TODAY!

800-775-4727

NEC: Versatility

NEC Versa E
DX4/75-340
Now Available

MultiSync Monitors

View the latest in the line of award-winning monitors, which include a 3-year warranty!

3V

- ▲ 15" SVGA
- ▲ 1024x768, .28mm ni
- ▲ 72MHz VESA refresh rate
- ▲ MPR II, EnergyStar compliant
- ▲ Great for Entry-level business/Windows applications



\$469.99

5FGp

- ▲ 17" SVGA
- ▲ 1280x1024, .28mm ni
- ▲ Opticlear surface
- ▲ Intelligent Power Management System
- ▲ Great for entry-level CAD, color desktop publishing



\$1109.99

6FGp

- ▲ 21" SVGA
- ▲ 1280x1024, .28mm ni
- ▲ Opticlear surface
- ▲ Intelligent Power Management System (IPM)
- ▲ Great for professional CAD/CAM/CAE, graphic design, color desktop publishing

\$2019.99

NEC

UltraLite Versa E

- ▲ 486 processor
- ▲ 4MB RAM, expandable to 20MB
- ▲ 2 Type II PCMCIA slots
- ▲ MS-DOS 6.2, Windows 3.1, built-in trackball

Processor	Screen	Hard drive	Price
DX2/40	Active color	120MB	\$3819
DX2/40	Active color	250MB	\$4229
DX2/50	Monochrome	209MB	\$3259*
DX2/50	Active color	209MB	\$4499
DX2/50	Active color	340MB	\$4919
DX4/75	Active color	340MB	\$5229

Lease for \$120/mo.

\$3259*

UltraLite Versa E

The Versa E notebook series is upgradable to grow with your needs. For ease of upgrade and service, the UltraLite Versa's floppy drive, hard disk drive and memory card slide in and out of their storage slots. If you require extended battery life, slide out the Versa's floppy drive, pop in a second battery, and double your time on the road.



Ready Multimedia Desktops

Get Ready for an impressive multimedia system from NEC. The Ready 425CD2 and Ready 433CD3 feature built-in ready-to-run CD-ROM readers, a complete sound system, and a comprehensive software offering to introduce you to multimedia computing. Also sporting local bus graphics and 24-bit true color, the multimedia Ready will speed through your applications and display them in bright, clear colors.



Ready Multimedia Desktops

- ▲ 4MB RAM expandable to 36MB
- ▲ 9600/4800 fax, 2400 data modem
- ▲ Fast double or triple speed CD-ROM
- ▲ MediaVision sound card, speakers
- ▲ MS-DOS, Windows 3.1, America-On-Line, CompuServe
- ▲ CD-ROM titles include: PFS: Window Works, Compton's Encyclopedia, Dinosaur Adventure and Space Adventure

Processor	Hard drive	Price
486SX/25	170MB	\$1429
486SX/33	250MB	\$1799

NEC SVGA monitor \$319.99
Lease for \$52/mo.

\$1429

PowerMate Desktops

- ▲ 4MB RAM expandable to 36MB
- ▲ 8KB cache expandable to 256KB
- ▲ Local bus True Color video
- ▲ Graphics accelerator
- ▲ 3 expansion slots, 3 drive bays
- ▲ MS DOS, Windows 3.1, NEC mouse

Processor	Hard drive	Price
486SX/33	170MB	\$1129
486DX2/50	210MB	\$1399
486DX2/66	210MB	\$1749

NEC SVGA monitor \$319.99
Lease for \$55/mo.

\$1129

PowerMate Desktops

Meeting your needs for aggressive pricing and outstanding quality, the PowerMate 486 series features local bus video and a graphics accelerator to deliver falcon-like speed. By combining 486 processing power with local bus video and True Color support, the PowerMate takes you to new heights in performance.



NEC MultiSpin 3X CD-ROM Drives

New from NEC—the fastest CD-ROM Drives available

- ▲ Triple speed 450Kb/sec transfer rate, 195ms access time & 256K buffer
- ▲ MPC Level 2 compliant, Multisession Photo CD & XA-compliant
- ▲ Sleek new design features front panel LCD controls for display of data, audio & diagnostics data
- ▲ Full audio control buttons (play, repeat, track advance, pause, stop) on front panel for your music CDs. And play audio CDs without a PC.

MultiSpin 3Xp Portable Drive \$429.99
MultiSpin 3Xi Internal Drive \$479.99
MultiSpin 3Xe External Drive \$569.99



NEW!
Quad Speed Drive
Available

PCs COMPLEAT

THE BEST: BRANDS · PRICE · DELIVERY · SERVICE

Weekdays Open 24 hours
Weekends & Holidays 10 A.M. - 8 P.M.

CALL TODAY!

800-775-4727

IBM® • IBM® • IBM®

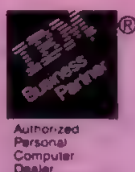
ValuePoint® SpaceSavers

Advanced performance at an entry level price

- ▲ 4MB RAM exp. to 64MB
- ▲ VESA Local Bus graphics
- ▲ 512KB Video RAM exp. to 1MB
- ▲ 2 Serial, parallel, mouse, and keyboard ports
- ▲ IBM DOS 6.1/MS Windows 3.1, mouse, enhanced 101 keyboard

Processor	Hard Drive	Price*
486SX/25	120MB	\$889**
486SX/25	120MB	\$929
486DX/33	212MB	\$1399
486DX2/66	212MB	\$1789

* **includes IBM basic keyboard



ValuePoint® SpaceSaver

ValuePoint® Desktops

Maximum expandability in a desktop

- ▲ 4MB RAM exp. to 64MB
- ▲ Pentium upgradable
- ▲ VESA Local Bus graphics (w/open VESA slot)
- ▲ 1MB Video RAM exp. to 2MB
- ▲ 5 expansion slots, 5 drive bays
- ▲ IBM DOS 6.1, MS Windows 3.1, mouse

Processor	Hard Drive	Price*
486SX/33	170MB	\$1359
486DX/33	212MB	\$1559
486DX/33	340MB	\$1719
486DX2/66	340MB	\$2159

Minitower models also available

ValuePoint® Multimedia

Multimedia. Ready to run.

▲ Based upon the ValuePoint® Desktop models

Multimedia Components Include:

- ▲ SoundBlaster 16 stereo sound card
- ▲ IBM internal double speed CD-ROM drive
- ▲ Creative Labs speakers & microphone
- ▲ 10 CD-ROM software titles

Processor	Hard Drive	Price*
486DX/33	212MB	\$2099
486DX2/66	340MB	\$2699



Call Your Sales Associate for Complete Details

ValuePoint® P60/D Pentium

The ultimate power trip

- ▲ 16MB RAM exp. to 128MB
- ▲ 256KB cache standard
- ▲ 4 expansion slots (2 PCI, 1 PCI/AT, 1 AT)
- ▲ 5 drive bays

Processor	Hard Drive	Price*
Pentium 60MHz	424MB	\$4039
Pentium 60MHz	525MB	\$4099

*monitor priced separately

ThinkPad® 500 subnotebooks

Lighten your load, and increase your power

- ▲ IBM 486SLC2/50 processor
- ▲ 4MB RAM exp. to 12MB
- ▲ 170MB hard drive
- ▲ 7.4" VGA monochrome display
- ▲ 1 Type II PCMCIA slot
- ▲ TrackPoint II integrated pointing device
- ▲ 3.5" external floppy drive
- ▲ NiMH battery, AC adapter
- ▲ Weighs only 3.8 lbs. (w/battery)
- ▲ IBM DOS 6.1, Prodigy



\$1939

Texas Instruments

4000E Monochrome

- ▲ 4MB RAM expandable to 20MB
- ▲ 120/200MB hard drive
- ▲ 10" monochrome display
- ▲ Enhanced high-speed video
- ▲ MS-DOS 6.2, Windows 3.1

\$1679



Processor	Hard Drive	Price
486SX/25	120MB	\$1679
486DX2/50	200MB	\$2429

Lease for \$62/mo.

4000E Enhanced Color

- ▲ 4MB RAM expandable to 20MB
- ▲ 120/200MB hard drive
- ▲ 8.2" enhanced color display
- ▲ Enhanced high-speed video
- ▲ MS-DOS 6.2, Windows 3.1

\$1929



Processor	Hard Drive	Price
486SX/25	120MB	\$1929
486DX2/40	200MB	\$2699

Lease for \$71/mo.

4000E WinDX2/50 Color

- ▲ 486DX2/50 processor
- ▲ 4MB RAM expandable to 20MB
- ▲ 200MB hard drive
- ▲ 8.4/9.4" color screen
- ▲ Enhanced high-speed video
- ▲ MS-DOS 6.2, Windows 3.1

\$2999



Screen Type	Diagonal	Price
Dual Scan	9.4"	\$2999
Active Matrix	8.4"	\$3799

Lease for \$110/mo.

4000E WinDX4/75 Color

- ▲ IntelDX4/75 processor
- ▲ 16KB internal cache
- ▲ 4MB RAM expandable to 20MB
- ▲ 340/455MB hard drive
- ▲ 8.4/9.5" active matrix screen
- ▲ MS-DOS 6.2, Windows 3.1

\$4499



Screen Size	Hard Drive	Price
8.4"	340MB	\$4499
9.5"	455MB	\$4999

Lease for \$165/mo.

Intelligent Docking System

Use your TravelMate notebook as a powerful 486 desktop PC with the new Intelligent Docking System

- ▲ 6 16-bit expansion slots
- ▲ 4 drive bays
- ▲ 2 PCMCIA Type III slots
- ▲ Windows for Workgroups upgrade included
- ▲ Designed for all TravelMates with QuickPort connection

\$799⁹⁹

PCM-5/B4A



Open 24 hours Weekdays
Weekends & Holidays 10 A.M. - 8 P.M.

CALL TODAY!

800-775-4727

CIRCLE 268 ON READER SERVICE CARD



PUBLISHER'S TOOLBOX



CALL PUBLISHER'S TOOLBOX: 1-800-756-2250 TO ORDER or ORDER BY FAX: 800-820-1112

PUBLISHING

- ☐ = Windows Application
- Adobe**
 - ☐ Photoshop559
 - ☐ Photoshop & Illustrator619
 - ☐ Photoshop & DSP accelerator675
 - ☐ Streamline 3.0125
- Aldus**
 - ☐ Freehand 4.0CALL
 - ☐ Gallery Effects Vol. 1.3ea. 133
 - ☐ Pagemaker 5.0529
 - ☐ Photostyler 2.0 (Special!)349
- Clip Art**
 - Masterchips CD/Disk99/109
 - Pixar One Twenty Eight175
- Corel**
 - ☐ CorelDRAW! 4.0 Disks/CD359/259
 - ☐ CorelDRAW! 3.0 Disks/CD125/99
 - ☐ Version Upgrade Disks/CD211/165
 - Art-Show '94 (Book + CD)25
 - Corel Gallery39
 - Corel Photo CD's (In Stock)ea. 35
 - Corel SCSI 2.0/Network Mgr.95/395
 - ☐ Ventura Publisher 4.2 (CD)139
- Multimedia**
 - ☐ Compel229
 - Flying Fonts119
 - ☐ Kodak Photoedge/CD Access.99/29
 - ☐ Multimedia Toolkit495
 - 3D Designer289
 - ☐ Video Director119
- Publishing Standards**
 - ☐ Andromeda Filters69
 - ☐ Designer 4.0/Comp. Upgrade 439/189
 - ☐ Fauve Matisse/with Kai's99/145
 - ☐ Fractal Painter 2.0/X2259/89
 - ☐ Framemaker 4.0/Upgrade599/195
 - ☐ Freedom of Press Classic89
 - ☐ Kai's PowerTools/Digital Morph109/69
 - ☐ Morph105
 - ☐ Ofoto 2.0 (Color)199
 - ☐ Picture Publisher/Upgrade 4.0 429/189
 - ☐ QuarkXPress565
 - QuarkXTensionsCALL
 - ☐ Zscript/Superprint265/89

TYPOGRAPHY

- Adobe Type Library**
 - Volumes 1-380 (Special!)CALL
 - ☐ Fontographer/Fontomatic255/39
 - ☐ FontMinder/FontMongerea. 49/89
 - ☐ Cynlic/East European Fontsea. 99
- Monotype Type Library**
 - CD (Open)/Value Pack1449/59
 - Monotype FontFont CD (8 Free!)39
 - ☐ DefiniType Plus/Vol. 149/35
- URW CD Type Library**
 - Volume 1/Volume II (3,000 open) ea. 699

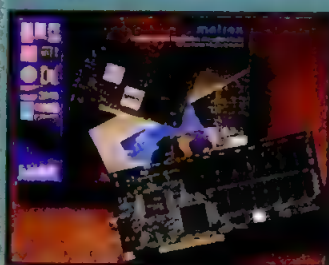
MICROSOFT

- ☐ Encarta89
- ☐ Excel 5.0/Upgrade299/95
- ☐ Office 4.2475
- ☐ Office Upgrades275/245
- ☐ Publisher 2.089
- ☐ Windows 3.1/Upgrade/NT 95/3295
- ☐ Word for Windows 6.0299
- ☐ Word 6.0 Upgrades95/125

BUSINESS

- ☐ After Dark/Disneyea. 29
- ☐ Hijaak Pro 2.0 (\$20 Rebate!)69
- ☐ Mac-In-Dos/Plus99/149
- ☐ Omnipage Pro 5.0 (Special!)459
- ☐ Ready, Aim, Fire!49
- ☐ Recognita Americas295
- ☐ Recognita Plus249
- ☐ Textbridge75
- ☐ Transverter Pro189
- ☐ Wordscan/Wordscan+ 2.0179/359
- ☐ WordPerfect 6.0269
- ☐ Winfax Pro/Network77/269
- ☐ Uninstaller49

GRAPHICS SOLUTIONS



The MGA Ultima series of graphics accelerators offers the world's fastest and most powerful 8, 16 and 24-bit color performance for graphically intensive Windows, Multimedia and CAD applications. Based on Matrox's revolutionary MGA 64-bit graphics chip, the Ultima outperforms standard 32-bit cards by as much as 12x and

provides the highest resolutions and refresh rates at multiple color depths. Supports PCI and VLB local buses. Comes standard with 2 MB of VRAM memory. The MGA format for PCI and VLB is upgradeable to 4 MB of memory.

MGA Ultima Plus VLB 2 MB\$149
MGA Ultima Plus VLB 4 MB\$199
MGA Ultima Plus PCI 2 MB\$149
MGA Ultima Plus PCI 4 MB\$199



Kai's PowerTools

Kai's POWER TOOLS™ sets the standard for artistic image generation and special effects with 33 of the most useful image manipulation tools available! Apply brilliant new effects and techniques to scanned photographs and other images with stunning results. Powerful and useful tools for art directors, graphic designers, illustrators, photographers, videographers, 3-D renderers and multimedia producers.



Astound sets new standards for "static" and multimedia presentations. Familiar "outline and slide" approach makes it easy to learn and use. Text editing, drawing, charting, sound, animation, and video combine for superior results. Built-in animations assemble charts or text before your eyes. Imports Freehand and PowerPoint files. Distributable runtime capability.



PC Magazine says Presentation Task Force is "The best CGM clip art package for overall quality and useability." The ultimate full-color clip art for over sixty leading DOS and Windows applications now features an incredible 3,500 people, business, healthcare, holiday, and more! Includes a FREE color to B&W conversion feature for high contrast line art reproduction!

CD ROM & 3.5" Disk included!

Video Cards

	ISA	VLB	PCI
ATI Graphics Ultra Plus, 2 MB	235		
ATI Graphics Ultra Pro*, 2 MB	357	357	397
Diamond Stealth 24, 1 MB	155	155	
Diamond Viper, 2 MB		389	455
Hercules Dynamite, 1/2 MB	159/199	159/199	CALL
Hercules Graphics, 1/2 MB	259/385	CALL	
Matrox Impression Pro, 3/4 MB	775	775/1189	
Matrox Ultima Plus 200, 4 MB		1029	1029
Number 9 GXE 11/12, 2/4 MB	339/425	339/425	
Number 9 GXE 64 Pro, 2/4 MB		369/669	
Number 9 GXE 64 1/2 MB		179/259	179/259
Number 9 GXE 14/16, 4 MB		639/839	
Supercard Spectrum/Thunder, 3/3 MB	725/1345	725/1345	

*FISA version CALL

TYPE BUNDLE OF THE CENTURY

Ares FontMinder: install and uninstall your Postscript or TrueType fonts without having to restart Windows

Altays Fontomatic: create wild and wacky TrueType fonts and special effects in a click!

Monotype Value Pack: 57 gorgeous typefaces from one of the world's leading foundries

Monotype CD: choose from 2150 fonts from Adobe and Monotype collections... includes 8 free fonts!

Adobe & Monotype Specimen Book: the perfect reference book to examine both these collections in detail!

LIST

79

50

99

59

99

Compare our price with total list price: \$325

ORDERING/SHIPPING INFORMATION

Visa, MasterCard, & American Express Accepted. No Surcharge. Your credit card is not charged until the order is shipped. Corporate purchase orders are subject to credit approval. C.O.D. add \$5.00. Certified bank check, money order or cashier's check: \$2.00/0.00 maximum. No sales tax (WI residents add 5%). All prices subject to change without notice. All items subject to availability. Hardware replaced or repaired at our discretion. All software and hardware is subject to manufacturer's warranty.

We accept University & Government purchase orders

All returns must be in the original packaging and have a return authorization number. A restocking fee may apply. Overnight, all software and light hardware up to 5 pounds add \$5.95. Add \$1.00 per pound thereafter. We ship Airborne Overnight unless UPS Ground delivers the next day. *\$3.00 UPS Ground per order; hardware over 15 pounds is shipped and charged at standard UPS Ground rates. International & Canadian orders welcome!

Int'l: 416-425-1300 Canada: 1-800-235-3400
Germany: 0334613280 Denmark: 06610427
Norway: 06612467 Belgium: 078116486
Switzerland: 0433247 FAX: 800-820-1112

PUBLISHER'S TOOLBOX

Publisher's Toolbox: 6845 S. Greenview Dr., Suite 8, Middleton, Wisconsin 53662.
Hours: Mon-Fri 8 A.M.-7 P.M., Sat. 9 A.M.-5 P.M., central time.
©1994 Publisher's Toolbox Inc.

SCANNERS

- Hewlett Packard**
 - Scanjet IIP/ICXCALL
- Logitech**
 - Easy Touch229
 - Scanman 256/OCR169/199
- Microtek**
 - II/IXE/ISP/IIG659/1025/799/499
 - 35T Slide Scanner1449
- Musitek**
 - PrinScan for Laptops189
 - Scanmagic 256/Color123/245
- Nikon**
 - Coolscan Int/Ext1729/1959
- Tamarack**
 - 600/800 dpi (Special!)499/659
- Umax**
 - UC 630/840699/899
 - UC 1260/1200SE1235/2899
 - Vista625

PRINTERS

- Fargo**
 - Prinera (thermal color)689
 - Printer SuppliesCALL
- Hewlett Packard**
 - LaserJet 4, 4M, 4L, 4P, 4MPCALL
 - DeskJet 560c/1200cCALL
 - Memory/Postscript SIMMCALL
- Lasermaster**
 - Winjet 800/1200469/699
- Lexmark**
 - WinWriter 600CALL
- XLi**
 - Laserxp 5.01189
 - ImageXpert 5000/GA3949/4399

MONITORS

- Nanco**
 - F550i/F560i1189/1399
 - F560i/F660i1699/2375
- NEC**
 - All MonitorsCALL
- Nokia**
 - Multigraph 445X 21"2799

MULTIMEDIA

- Creative Labs**
 - Soundblaster 16 SCSI/ASP179/209
 - Soundblaster Pro/16115/137
 - Videoblaster/Videospigit325/239
- Digital Vision**
 - Televays549
- Intel**
 - Smart Video Recorder485
- Media Vision**
 - ProMovie Spectrum/Studio289/329
 - ProAudio Spectrum 16/Studio 16119/159
- Orchid**
 - Videola339
- Turtle Beach**
 - Multisound Monterey/Tahiti349/269

TABLETS, STORAGE

- Acecad**
 - Acecat 5"x5" (New!)115
- Calcomp (New!)**
 - 6x9 Pressure Sensitive279
 - 12x12 Pressure Sensitive399
- Iomega**
 - Insider 150/Multidisk 150549/559
- Syquest**
 - Sydos 44 meg Int/Ext319/389
 - Sydos 88 meg Int/Ext399/489
 - Syquest CartridgesCALL

Wacom New UD Series

- High resolution tablets for Graphic Designers with pressure sensitive pen.
- 6x8 Art2\$350
- 12x12\$480

Now You Can Design a Chess Set **WITHOUT GETTING ROOKED!**



Chess set completely drawn and rendered in DesignCAD 3D.



Wireframe drawing of chess set from above.

Purchasing computer software often seems to be a game of strategy. You plot your best moves in order to get the best software without having to sacrifice too many pawns (or too much cash!).

Now, however, your queen has arrived! DesignCAD 3D has what you are looking for in a complete 3D CAD system.

DesignCAD 3D comes complete right out of the box with everything you need to create professional 3D drawings at a fraction of the price of competing CAD products. And since DesignCAD 3D is priced

at only \$499, you won't be in check after you buy it!!

Features such as:

- ➔ *Render with textures: marble, steel, wood and more!*
- ➔ *10 different file formats including IGES, HPGL and DXF!*
- ➔ *Boolean Operations allow true solid modeling!*
- ➔ *Programming language to create your own commands!*
- ➔ *Volume, surface area and center of gravity calculations!*
- ➔ *3D text/dimensioning, materials list, macros and more!*

DesignCAD 3D is designed with you in mind. It is simple and logical to use. In fact, you will be designing within minutes of opening the box. To order DesignCAD 3D, call, write or fax your order to a member of our sales staff and they'll be happy to help.

For more information

FREE 16-page color book

demo disk, simply call, fax or

write. Make sure to ask about our

competitive upgrade offer!



Phone (918)825-7555

Fax (918)825-6359



American Small Business Computers • One American Way • Pryor, OK 74361

CIRCLE 025 ON READER SERVICE CARD

Lean, Mean, "Green" Machines From Amdek!



"Lean" on price, "Mean" on full features, and "Green" on helping to protect you and the environment! The Amdek AM/815E (\$379) and the AM/817E (\$839) monitors meet the Swedish MPR-II low radiation emission guidelines and the VESA DPMS Energy Star power savings standard. These two monitors will power down when not in use to help save you and the world money on energy. Amdek introduced the industry's first PC video monitor in 1978 and has been

successfully providing quality PC monitor solutions for over fourteen years. Amdek "Direct" offers great prices, a 30-day money back guarantee, toll-free technical support, a one year warranty, no surcharge on credit card orders, low pricing on evaluation units, and special programs for resellers and corporate accounts. Amdek "Direct"—The best combination of great prices, proven support and immediate availability from a company with over fourteen years of display experience!

Amdek Family of Display Products

	AM/432E	AM/732E	AM/732NI	AM/815E	AM/817E
Screen Size	14"FS VGA Mono	14" SVGA Color	14" SVGA Color	15"FS SVGA Color	17"FS Hi-Res Color
Max Resolution	640x480	1024x768	1024x768NI	1280x1024NI	1600x1200NI
Max Refresh Rate	70 Hz	70 Hz	90 Hz	90 Hz	105 Hz
Dot Pitch	N/A	.28mm	.28mm	.28mm	.26mm
110-240 VAC (Auto-sensing)	Yes	Yes	Yes	Yes	Yes
MPR II Compliant	No	No	Yes (as option)	Yes	Yes
Power Management	No	No	No	Yes	Yes (Avail. 3/94)
PIN Cushion Control	No	No	No	Yes	Yes
*Unit 1 Price	\$109	\$269	\$279	\$379	\$839
*Unit 2-9 Price	\$106	\$263	\$272	\$369	\$818
*Evaluation Unit Price	\$94	\$239	\$259	\$349	\$759

To Order Call Toll Free:
800-72-AMDEK
Call For Volume Discounts

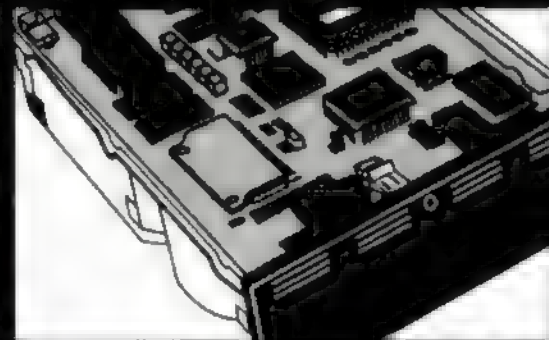
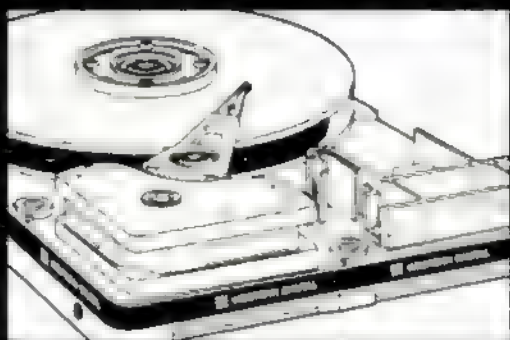
AMDEK
VALUE THROUGH THE YEARS

*Amdek "Direct" pricing. We accept Visa, Mastercard, or cashier's check. Trade accounts are available with credit limits and terms. Shipping, handling, and applicable sales tax not included in the price. All prices, offers and specifications are subject to change without notice. Any return being shipped to an Amdek location will require an RMA (Return Merchandise Authorization) number. Original packaging and proof of purchase required to return any merchandise. Amdek is a registered trademark of Wyse Technology Inc. All other trademarks are the property of their respective owners and are used for identification purposes only. ©1993 Wyse Technology Inc.

MEGAHAUS

HARD DRIVES

Your Drive Company!



UNEQUALED REPUTATION

Nobody knows drives like MegaHaus. We have specialized in storage solutions for over 8 years. Repeat business from satisfied customers is the backbone of our business. We satisfy our customers.

DIRECT REPLACEMENT WARRANTY

During the first year of your warranty, we replace, not repair, any defective items. All items receive lifetime technical support from our factory trained techs.

SAME DAY SHIPPING

Our multi-million dollar inventory offers you the best diversity and availability in the market. We ship most orders the same day. Each order is checked at least four times for accuracy.

FAST, EASY INSTALLATION

Anyone can sell you a hard drive. We sell easy to install storage solutions. We spend countless hours researching the best solutions, then create our quick precise installation guides for each kit.

MONTHLY SPECIALS

Maxtor

The MXT540A is the fastest 540MB IDE drive made! It features a 8.5ms average access time, 6300rpm spindle speed, and a 256K buffer. This is a 3.5" low profile drive with a 1 year warranty.

ONLY \$439



SyQuest

Now available 270MB!

SQ3105A IDE Drive Bare with GSI-18 & 1 disk \$239
Portable external, attaches to printer port with 1 cartridge \$399

105MB Removable Media Drive. The #1 storage solution for the 1990's. Hard drive speed (14.5ms). Low cost per MB. Mounts in 3 1/2" or 5 1/4" bay. Great for unlimited upgradability, data archival, transport & exchange, just to name a few.

SQ3105S SCSI Drive Bare \$279
with Adaptec 1522 & 1 disk \$399
with Adaptec 1542 & 1 Disk \$529
External for Macintosh & 1 Disk \$399



GSI drive accelerators increase the data transfer rate of your IDE drive 30 to 80%. Works by enabling the drives Read Multiple & Write Multiple commands to greatly increase performance. We highly recommend these products for WD, Conner, Quantum, Seagate, Micropolis, Maxtor, & Fujitsu. Alone w/Drive
GSI-21 Board supports 2 IDE, 4 floppy drives. Doubles QIC-80 tape drive speed \$65 \$55
GSI-18 Board supports 2 IDE drives. Works in conjunction with MFM, RLL, etc. \$55 \$45
GSI-32 Board same as -21 adds 2 16550 serial ports & 1 bi-directional parallel port \$139 \$119
GSI MaxIDEA Software solution works on existing IDE configuration (requires less than 1K of memory). Includes performance benchmark test. \$34 \$25

ALPHA RESEARCH

Disk caching controllers give your hard drives an effective disk seek time of less than .3ms. Each board is expandable up to 16MB of cache with standard SIMM memory. (Price listed is with no memory. Call for quote on populated boards.) All boards also have floppy support (except PCI).

IDE \$99
ISA (\$425I) \$139
VESA Local Bus (\$475I) \$229 / \$409
PCI (\$485I) / EISA (\$455I) \$409

SCSI \$10 Discount with any hard drive purchase!
ISA (\$425S) \$229
VESA Local Bus (\$475S) \$369
EISA (\$455S) \$409

HARD DRIVES

CONNER

IDE			
210MB	14ms	CFS210A	\$202
340MB	13ms	CFA340A	\$279
420MB	14ms	CFS420A	\$309
541MB	12ms	CFA540A	\$425

FUJITSU

IDE			
520MB	12ms	M2624T	\$529
SCSI			
1080MB	9ms	M2694ESA	\$799
2060MB	12ms	M2654ESA	\$1499

Maxtor

IDE			
245MB	15ms	7245A	\$249
345MB	14ms	7345A	\$278
540MB	12ms	7546A	\$459
540MB	8.5ms	MXT540A	\$459
SCSI			
340MB	14ms	7345S	\$349

MICROPOLIS

IDE			
1050MB	10ms	MC2210A	\$815
1740MB	10ms	MC2217A	\$1099
SCSI			
1050MB	10ms	MC2210	\$815
1052MB	8.5ms	MC4110	\$815
1740MB	10ms	MC2217	\$1122
3020MB	11ms	MC1936	\$2099
9100MB	12ms	MC1991	\$4059
SCSI-AV Audio / Visual tuned drives			
1000MB	10ms	MC2210AV	\$925
1700MB	10ms	MC2217AV	\$1229

Seagate

IDE			
213MB	16ms	ST3243A	\$209
260MB	16ms	ST3290A	\$229
341MB	12ms	ST3390A	\$269
452MB	12ms	ST3550A	\$340
SCSI (WIDE SCSI also available)			
1690MB	8ms	ST11950N	\$1469
2145MB	8ms	ST12550N	\$1639
2148MB	9ms	ST12400N	\$1399

HARD DRIVES

Quantum

IDE			
170MB	14ms	LPS170A	\$199
270MB	12ms	LPS270A	\$229
342MB	12ms	LPS340A	\$269
541MB	12ms	LPS540A	\$425
SCSI			
170MB	14ms	LPS170S	\$189
270MB	12ms	LPS270S	\$245
342MB	12ms	LPS340S	\$289
541MB	12ms	LPS540S	\$459
1080MB	10ms	IMP1080	\$799
1225MB	10ms	PD1225S	\$929
1800MB	10ms	PD1800S	\$969

WESTERN DIGITAL

IDE			
256MB	12ms	AC2250	\$235
341MB	12ms	AC2340	\$270
425MB	12ms	AC2420	\$315
540MB	11ms	AC2540	\$409

IBM PS/1 PS/2 DRIVES

Complete solutions for your IBM. Larger sizes in stock! 170MB 240MB 340MB
PS/1 (Above Drive requires adapter card unit)
286 (Above Drive) \$319 \$379 \$439
386 & 486 \$239 \$299 \$349
PS/2
25, 30, 30-286 \$299 \$359 \$419
35 & 40 \$229 \$289 \$339
50 thru 95 SCSI \$429 \$469 \$549
PS/2 210MB 420MB \$40MB
50 thru 95 IDE \$429 \$599 \$729

CONTROLLER CARDS

ADAPTEC	Alone	w/Drive
A1522BASIC 16Bit SCSI	\$129	\$109
A1542CBASIC 16Bit SCSI	\$225	\$215
A2742 EISA SCSI	\$389	\$369
A2842 VESA SCSI	\$319	\$299
T130 8Bit SCSI	\$79	\$65
T348 Parallel to SCSI	\$189	\$179
FUTURE DOMAIN		
1680SVP 16Bit SCSI	\$155	\$139

Many other types of controllers in stock.

CD ROM DRIVES

NEC	CDR900	4X	180ms	\$979
NEC	CDR510	3X	195ms	\$409
Toshiba	XM3401	2X	200ms	\$339
Toshiba	XM4101	2X	320ms	\$239
Sony	CDU561	2X	295ms	\$289
Teac	CD50	2X	265ms	\$259
Pioneer	External CD Changers (300ms)			
DRM602X	6 disc	307KB/sec		\$899
DRM604X	6 disc	612KB/sec		\$1149
DRM1804X	18 disc	612KB/sec		\$2059

MULTIMEDIA KITS

SCSI Drive, sound card (in retail pkg)				
MV=Media Vision Pro Audio 16. MS=Media Vision Pro Studio 16				
SB= Sound Blaster 16 SCSI. SA= Sound Blaster SCSI ASP.				
	MV	MS	SB	SA
XM4101	\$389	\$419	\$429	\$469
CD50	\$399	\$439	\$449	\$489
CDU561	\$429	\$459	\$469	\$519
XM3401	\$479	\$509	\$519	\$559
CDR510	\$549	\$579	\$589	\$629
CDR900	\$1119	\$1149	\$1159	\$1199

CD ROM TOWERS

CD ROM Drive Towers - Multiple CD ROM drives in a single external enclosure. Great for networks, BBS, or business.

	2 Drive	4 Drive	7 Drive
XM4101	\$609	\$1319	\$2339
CD50	\$649	\$1389	\$2479
CDU561	\$699	\$1479	\$2639
XM3401	\$819	\$1739	\$3079
CDR510	\$979	\$2059	\$3499
CDR900	\$2119	\$4339	\$7489

BUNDLE SPECIALS WITH ANY CD DRIVE PURCHASE!

Free \$25 ADI Photo CD processing coupon with each CD ROM Drive!
6 Title CD Bundle \$69
Illustrated Encyclopedia, World Atlas, Mavis Beacon Teaches Typing, San Diego Zoo's Animals, US Atlas, Chessmaster 3000)
Caddies \$5 Macintosh CD Driver \$29
Altec Lansing ACS-100 Speakers \$109

HARD DISK CARDS

Drive & controller on card. Saves drive bay. Compatible with XT, AT, Tandy, PS/2 and others. Super easy installation! IDE / SCSI
170MB \$269 / \$289 240MB \$329 / \$349
340MB \$379 / \$409 540MB \$619 / \$649

TAPE DRIVES

CONNER

250MB QIC-80 tape drives includes software & tape	Alone	w/Drive
Internal fits 3.5 or 5.25 bay	\$155	\$139
External for printer port	\$325	\$315
SCSI Tape Drives		
Kit is 16Bit card & 1 tape Bare Kit		
750-15Gig Exabyte 2501	\$549	\$739
2Gig Conner 4320	\$799	\$969
2Gig HP 35470	\$929	\$1049
4-8Gig Conner 4324	\$1119	\$1329
4-8Gig HP 35480	\$1059	\$1279
4-16Gig Sony SDT5000	\$1099	\$1299

REMOVEABLE DRIVES

Syquest	Bare	Kit
44/88MB 20ms SQ5110C	\$259	\$439
Syquest Media Best Price in this mag!		
TEAC Floppy Drives	Alone	w/HD
Floppy 1.4 (1.2 + \$9)	\$45	\$42
Floppy Combo 1.2 & 1.4	\$124	\$117

OPTICAL DRIVES

Kit is 16Bit Card & 1 disk	Bare	Kit
128MB Fujitsu	\$725	\$879
1.3Gig Hewlett Packard	\$2429	\$2699
1.3Gig Maxoptix-4MB	\$2599	\$2799
Verbatim Optical Media (Qty 5 price)		
128MB / 650MB / 1.3Gig	\$35 / \$77 / \$105	

PCMCIA

Maxtor 105MB, 19ms hard drive \$469
PCMCIA to SCSI adapter \$319
Desktop Docking Module! Mounts in 5 1/4" drive bay. Allows you to use any PCMCIA in your desktop \$219

MEGAHAUS
HARD DRIVES
1110 NASA Rd 1 #306
Houston, Texas 77058

1-800-786-1182

Ad. Code # PA52 Sales Hours (Central Standard Time)
8am - 7pm Monday thru Friday 9am - 3pm Saturday

FAX (713) 333-3024 Local (713) 333-1910

We sell within the United States, its territories, and Canada (sorry no international orders)

CIRCLE 018 ON READER SERVICE CARD



NO SURCHARGE

We accept Fortune 500 & Government bids & PO's. We check for COD and Credit Card fraud!

Prices & specifications subject to change without notice. Shipping charges are non-refundable. Returns must be in new condition and in original packaging. Defective items may not be refundable. No refunds on software or special orders (items not listed in ad). All refunds subject to 10% restocking fee. All trademarks and registered trademarks of their respective companies. Personal checks held for clearance. We reserve the right to refuse any sale for any reason. ©1993

Best Products. Best Prices.

30 PIN SIMMs

1x3 - 70	\$ 42
1x9 - 70	\$ 50
4x9 - 70	\$169
16x9 - 70	\$729

72 PIN SIMMs

(1 mb) 256 x 36	\$ 59
(2 mb) 512 x 36	\$ 89
(4 mb) 1 x 36	\$181
(8 mb) 2 x 36	\$354
(16 mb) 4 x 36	\$639

Expansion Boards

Aculogic	
RAMpAT Plus™	\$109
2-16 mb Expansion Board for 286 and 386 IBM-compatible machines	
Simply Ram/16™	\$145
1-32 mb Expansion Board for P/2 models 50 and 60	
Simply Ram/32™	\$145
1-64 mb Expansion Board for P/2 models 70 and 80	
EISA Ram™	\$189
1-128 mb Expansion Board for EISA Bus systems	

Laser Printer Memory

Hewlett Packard Laser Jet IIIi, 4, 4M, 4si, 4siMX & XL300	4mb...\$181
	8mb...\$354
Hewlett Packard Laser Jet IIP, III, IIP, IID	2mb...\$109
	4mb...\$179
Hewlett Packard Laser Jet II, IID	2mb...\$119
	4mb...\$199
IBM 4019, 4019e	2mb...\$116
	3.5mb...\$179
IBM 4029	2mb...\$ 89
	4mb...\$159
Epson EPL 6000	2mb...\$120
	4mb...\$199
Okidata 800, 820	2mb...\$129
	4mb...\$199
Panasonic 4410 & 4430	2mb...\$129
	4mb...\$199
Panasonic 4450i & 4420	2mb...\$129
	4mb...\$199

7921 Professional Cir.,
Huntington Beach, CA 92648

Office 714-848-5958
Fax 714-842-9437

7AM TO 5PM MONDAY
THRU FRIDAY P.S.T.

Laptop and Notebook Memory

AST	
Premium	4mb...\$164
Bravo 3/25s	
Bravo 3/33s	
Bravo LC/25s, 4/33, 4/33s, 4/50d, 4/66d	
Advantagel Pro486/bx/33	4mb...\$159
Pro486/sx/25	16mb...\$379
Advantagel Pro 386 SX/25	4mb...\$ 89
	8mb...\$289
COMPAQ	
Contura 3/20, 3/25, 3/25C	4mb...\$172
Contura 4/25 Series	8mb...\$309
	4mb...\$181
	8mb...\$344
ITE 286	2mb...\$ 99
	4mb...\$179
ITE 386s/20	4mb...\$229
ITE Lite 20, 25, 25c, 25e	4mb...\$229
	8mb...\$389
ITE Lite 4/25c	4mb...\$199
	8mb...\$359
SIT 386s/20	4mb...\$199
IBM	
ThinkPad 350, 350c	8mb...\$349
	16mb...\$749
ThinkPad 700, 720 series	8mb...\$389
PS/2 CL57SX, ThinkPad 750 series	4mb...\$209
	4mb...\$239
	8mb...\$429
	16mb...\$969
L40SX, PS/Note 182, N33SX	2mb...\$103
	4mb...\$185
	8mb...\$329

AST

Premium	8mb...\$369
	16mb...\$709
Bravo 3/25s	2mb...\$ 96
	8mb...\$316
Bravo 3/33s	2mb...\$ 89
	8mb...\$282
Bravo LC/25s, 4/33, 4/33s, 4/50d, 4/66d	4mb...\$149
	16mb...\$619
Advantagel Pro486/bx/33	4mb...\$159
Pro486/sx/25	16mb...\$379
Advantagel Pro 386 SX/25	4mb...\$ 89
	8mb...\$289

CALL ON ALL IBM MEMORY!
We'll beat any advertised price!!

COMPAQ

DeskPro 386-20, 20e & 25	4mb...\$ 189
DeskPro 386s/16	4mb...\$ 189
ProSignia PC Server 486/33 DX 2/66, SystemPro IT Series, M, N and I Series	1mb...\$ 59
	2mb...\$ 89
	4mb...\$181
	8mb...\$354
DeskPro 386-33, 486-33 & System Pro	2mb...\$ 99
	8mb...\$369
ProLinea 3/25s, 3/25zs	2mb...\$ 95
	8mb...\$319
ProLinea 4/25s, 4/33, 4/50, 4/66	1mb...\$ 59
	2mb...\$ 89
	4mb...\$181
	8mb...\$354

Same Day Shipping
P.O.'s, Educational P.O.'s,
Corporate P.O.'s, Government
Prices subject to change

800-588-6348

MEMORY

DIRECT!

CIRCLE 363 ON READER SERVICE CARD



**Yes! That's
62% off on
every issue!!!**

**Call now to get PC Magazine
delivered to your door for up to
62% less than you'd pay at the
newsstand.**

**Act fast...
and get software FREE!**

**Call now and you'll get our new-subscriber
bonus — 3-disks packed with 146 all-star
utilities for DOS, Windows™ and Laptops —
FREE with your paid order!!!**

- **1 YEAR of PC MAGAZINE** (22 issues) for only \$29.97 — 54% off the \$64.90 cover price!
- **SAVE MORE! 2 YEARS** (44 issues) for only \$49.97 — that's 62% off!

**BONUS: 3-DISK
UTILITIES
LIBRARY —
FREE!**



**CALL
1-800-289-0429**

**To insure savings and bonus, be
sure to mention this code when
you call: 4294**

Premier

The color showcase that puts the spotlight on leading-edge PC products and services.

369-383

Windows

An every-issue four color section featuring quality products for the Windows environment.

383

Classified

Flexible-format display advertising: computer systems, components, software and more.

384-396

BusinessCard

A forum for innovative, hard-to-find and low cost PC hardware, software and services.

397-400

HARDWARE

Boards/Components/Chips	370	384
Communications	372	
Computer Systems	373	384
Input/Output Devices/Barcoding	374	386
Mass Storage Devices	375	388
Midi		
Multi-Media	376	
Networking	378	
OS2		
Security		
Video		

SOFTWARE

Business Applications	378	388
—Single-Solution	371	
Communications		
Education	380	389
Financial		
Graphics/Design	380	389
Multi-Media	380	389
—Midi-Music		
Personal	381	390
Public Domain		
Scientific		
Security	390	

Shareware		391
Systems/Languages		
Utilities	381	391
Vertical Applications		
Video		
Adult		393
SUPPORTING PRODUCTS		
Information Resources	383	
Services		391
—Data Conversion		391
—Data Recovery		392
—Software Duplication		392
Supplies		393



1800 Alvarado Blvd., Suite 111 • San Diego, CA 92111
FOR SALES CALL TOLL FREE
1-800-581-6040
Customer Service (619) 581-1439

WE WILL BEAT ANY ADVERTISED PRICE!

P.O.'s accepted from International and Qualified Firms

CD ROMS

MITSUMI LU00F1 FX001D Int., 280ms, 150KB's tray-loading, multi-session, 16 bit card \$7.99

TOSHIBA TB3401 Int., double speed, 250ms. 16 bit card \$7.99

PHILIPS PL206 Int., double speed, 200MS 330KB'S 256K buffer, multi-session, Kodak photoCD \$229

Double speed CD-ROM, multi-session, with 16 bit interface \$229

VIDEO CARDS

DIAMOND GREAT BUY

Diamond's video cards are award-winning and cost effective video solutions. Their popular selling SpeedStar board has won numerous awards including PC Magazine Award's #1 Video Accelerator. Their new Stealth and Viper are truly the cutting edge in true color 24-bit video technology. Five year limited warranty, unlimited technical support.

SpeedStar24x ISA, max. 1024x768 Hi. 72MHz 24-bit, 16.7 ms colors \$119

SpeedStarVL VL-Bus, 16 ms WinMark 1MB 16.7 Mhz Colors, 72MHz \$119

Stealth 24VL VL-Bus, 1024x768 Hi. \$149

StealthProVL1 VL-Bus, S3 928 chip, 1MB VRAM \$199

ViperVL VL-Bus, 16.7 ms, 1MB VRAM \$339

Cirrus Logic Cirrus Logic SVGA VLB 1MB Upgradable to 2 \$119

MOTHERBOARDS

40 486 BX/DC BOARDS INCLUDE 256 K CACHE, 100% CMOS SET AMI BIOS, CLOCK GENERATOR, UPGRADABLE TO 32MB RAM.

CYRIX-ISA 486DLC33 --- \$229 486DLC40 --- \$239 486DLC40 3-10 BIT, 3-4 BIT 486SLC2/66-IBM ISA 5-16M 2.4 bit Landmark 153.21 \$275

CYRIX-VLB 486DLC33 VLB --- \$249 486DLC40 VLB --- \$259 486DLC40 VLB 3-10 BIT, 3-4 BIT 486SLC2/66 VLB 8 Slots, 2 VLB, 6-ISA Landmark 153.07 \$329

INTEL VESA LB 486DLC33 VLB --- \$639 486DLC33 VLB --- \$388 486DLC VLB W/D CPU \$115

MINI EISA 486DLC2/66-IBM 486DLC33 VLB \$479 486DLC33 VLB \$139

TAPE DRIVES

Conner 250 Win Tape \$149

Colorado Jumbo 250 \$155

IDE HARD DRIVES

CONNER 130mb \$149 160mb \$159 200mb \$169 250mb \$179 320mb \$189 400mb \$199 480mb \$209

MAXTOR 130mb \$149 160mb \$159 200mb \$169 250mb \$179 320mb \$189 400mb \$199 480mb \$209

Seagate ST120MA 120mb \$179 ST130MA 130mb \$189 ST130MA 130mb \$189 ST130MA 130mb \$189 ST130MA 130mb \$189

Western Digital WD120 120mb \$179 WD225 225mb \$229 WD230 230mb \$239 WD230 230mb \$239 WD230 230mb \$239

MEMORY

CALL FOR BEST PRICE • ALL UNITS • CYRUS AVAILABLE

IBM-PS/2 6450804 512X36-70 1X3-70 1X9-70 4X3-70 4X9-70 16X9-70

72 PIN SIMMS 512X36-70 1X3-70 1X9-70 4X3-70 4X9-70 16X9-70

SIMMS/SIPPS 1X3-70 1X9-70 4X3-70 4X9-70 16X9-70

SPECIALS

CYRIX GREAT BUY

CX 83 D87-33 33MHz Processor \$39

FAX MODEM GREAT BUY

GVC 14.4 Kbit, unbuffered PC-Mag best 100 \$129

MAXTOR GREAT BUY

540 MB IDE MXT484 \$489

NOTEBOOK ADDONS

IBM Thinkpad 700 700C 720 4mg \$229 8mg \$435 16mg \$699

Toshiba 4500 4mg \$299 8mg \$499 16mg \$699

PCMCIA 14.4 Fax Modem \$255 SCSI Adapter \$259 Ethernet \$179

CONTROLLER BOARDS

Promate DC4030VL-VL/IDE Caching Controller \$139

Adaptec 1442C 150K SCSI Controller \$209

Adaptec 2742T EISA SCSI Controller \$299

IDEAO card, 2u/1p/1g \$10

IDEAO card, 2u/1p/1g \$28

SPECIAL MULTI MEDIA KIT

FUSION CD 16 Philips CD ROM Media Vision 16 Sound Card \$259

Lab Tec Speakers, 5 CD Titles.

CPU S 486DX2-66 \$459 486DX33 \$269 486DX40 \$75 486DX40 \$69

MATH CO S 8306733 \$39 8306740 \$49 8306733 \$45

SAME DAY SHIPPING AVAILABLE IF ORDER PLACED BY 2:30 P.M. P.S.T.

HOURS: MON-FRI 7AM-5:30PM P.S.T. SAT. 10AM-2 PM P.S.T.

20% Restocking fee on refunds within 30 days • No refunds after 30 days

• Warranty replacement only • All prices final • Prices subject to change

The only way to make your PC quieter is pull the plug.

Eliminate PC noise. Reduce wear. Save energy.

Does your PC whine, moan, buzz or growl? Stop those irritating noises before they drive you crazy. Put PC NoiseKiller and HD Silencer to work for you.



NEW in the U.S. Over 200,000 sold in Europe

HD Silencer™ shuts down your hard drive when your PC is inactive. Eliminates annoying high-pitched noise. Reduces hard drive wear during prolonged PC use. Installs in minutes in any 8-bit slot.

HD Silencer..... **\$89.95**

PC NoiseKiller™ dramatically reduces irritating fan noise. It senses your PC's temperature & cuts fan speed to match cooling needs. The fan runs slower and noise disappears. Works in laser printers. Installs in minutes.

PC NoiseKiller..... **\$69.95**



Greenware Technologies
32545-B Golden Lantern #424 • Dana Point, CA 92629
PCM517

30-day money back guarantee.

Call to order 1-800-839-5000

M/C VISA, \$7 S/H per order, CA sales tax may apply

CIRCLE 752 ON READER SERVICE CARD

SHARE PRINTERS and a lot more...

HIGH PERFORMANCE

At 180,000 cps parallel and 115,200 bps serial, Buffalo boxes are the fastest. Up to 16mb of buffer available

FASTER PRINTING

Sharing devices so fast they speed up printing using Windows. It's twice as fast as the new Windows Printing System

EASE OF USE

Transparent to users. Optional printer selection software included. Connect with standard parallel and serial cables

FLEXIBILITY

Eleven models in all parallel, all serial or in combination. Configurable I/O options. Models are easily cascaded together

VALUE

With non-buffered autoswitches starting at \$59 and intelligent sharing devices from \$349. Buffalo has the right sharing solution for you



We also make 72 contact

PC SIMMS!

1-800-345-2356



BUFFALO

2805 19th St. SE Salem, OR 97302
(503) 585-3414 • FAX (503) 585-4505

Buffalo is a registered trademark of Buffalo. "SharePrint" and "PrintShare" are registered trademarks of Buffalo. "PrintShare" is a registered trademark of Buffalo.

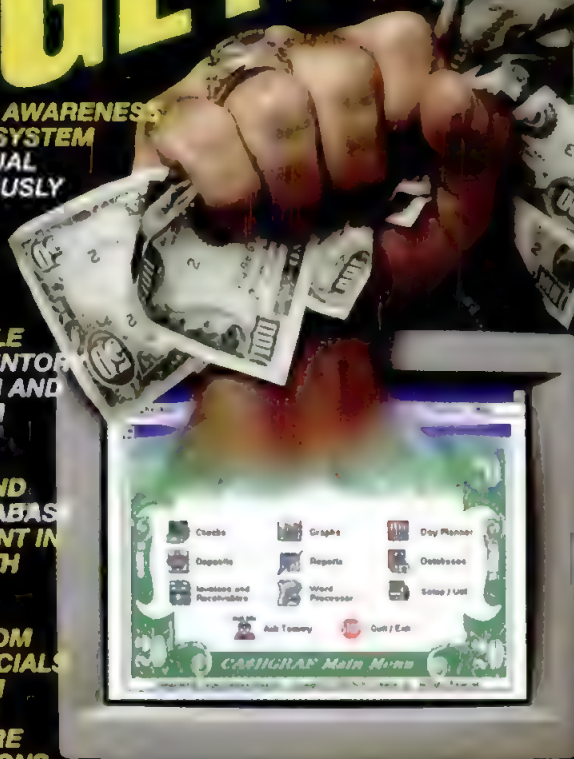
CIRCLE 753 ON READER SERVICE CARD

THE WORLD'S MOST POWERFUL SINGLE-SOLUTION OFFICE SOFTWARE!
THE AFFORDABLE SOLUTION THAT LETS YOU BECOME INSTANTLY PRODUCTIVE!
SPEND LESS TIME LEARNING, AND MORE TIME EARNING!

FREE!
 HOME VERSION
 INCLUDED WITH
 TARGET SOFTWARE

"GET A GRIP"

- EXCLUSIVE FINANCIAL AWARENESS AND GOAL TRACKING SYSTEM
- CHOOSE CASH, ACCRUAL OR BOTH SIMULTANEOUSLY
- 3 TYPES OF INVOICES
- PURCHASE ORDERS
- CREDIT MEMOS AND STATEMENTS
- ACCOUNTS PAYABLE
- ACCOUNTS RECEIVABLE
- FULL PERPETUAL INVENTORY WITH MULTI-LOCATION AND PRICE LEVELS BY ITEM
- CHECK WRITING
- DEPOSIT TRACKING
- POWERFUL PRESET AND USER DEFINABLE DATABASES
- CONTACT MANAGEMENT IN CLIENT DATABASE WITH "PHONE SCRIPT"
- WORD PROCESSOR WITH MAIL MERGE FROM DATABASE AND FINANCIALS
- DAY PLANNER SYSTEM
- UNIQUE PREPARE FOR ACCOUNTANT FEATURE SUPPORTS GL FUNCTIONS
- ON-SCREEN CONTEXT SENSITIVE HELP



REG. \$399.95
ORDER NOW AND
SAVE \$100.00!

INTRODUCTORY OFFER

\$299.95

THREE EASY CREDIT
 CARD INSTALLMENTS! OR C.O.D.
 PERSONAL CHECKS

90 DAY MONEY BACK GUARANTEE!

TOLL FREE SUPPORT!

GET INSTANTLY PRODUCTIVE!
 CALL NOW!

1-800-872-4880

CALL 24 HOURS, 7-DAYS A WEEK!
 FREE OVERNIGHT DELIVERY!

**...ALL THIS AND MUCH MORE, IN ONE EASY
 INTERACTIVE SOFTWARE PACKAGE!
 ONLY 4 DISKS TO INSTALL AND
 JUST ONE EASY REFERENCE MANUAL!**

YOU NO LONGER HAVE TO SPEND \$1,000.00 OR MORE
 FOR SEPARATE SOFTWARE PACKAGES THAT WON'T
 LIVE UP TO YOUR EXPECTATIONS.

...OR PERHAPS YOU ARE ONE OF THOSE WHO HAVE
 LEARNED THE "BITTER TRUTH" ABOUT WHAT SOME
 COMPANIES ARE TRYING TO CALL "SUITE"!

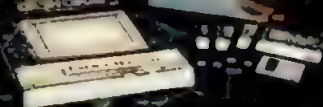


Look for this display at software retailers
 throughout the U.S. and Canada!

Call 1-800-872-4880 for dealers nearest you!

CASHGRAF

IF EXACTLY WHAT YOU EXPECTED WHEN YOU BOUGHT YOUR COMPUTER
 WAS AS QUICK AS YOUR EYES CLICK!



CASHGRAF operates on Windows 3.1 and
 requires 11 MB of hard drive, 4 MB of RAM,
 on 386 or higher system.

TARGET SOFTWARE GROUP
 2901 58TH AVE. N. ST. PETERSBURG, FL

THE WORLD'S EASIEST & MOST POWERFUL ICON DRIVEN GRAPHICAL REPORT GENERATOR

CIRCLE 781 ON READER SERVICE CARD

MAY 17, 1994 PC MAGAZINE 371

SOFTWARE/BUSINESS APPLICATIONS/SINGLE-SOLUTIONS

PREMIER

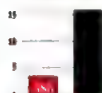
Upgrade?

\$1899*

(Good Performance)



Checkit 3.0 (Dhrystones in 1,000's)

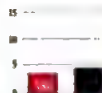
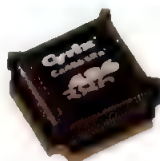


Cost per Dhrystone difference between 386SX and 486DX = \$0.14 per Dhrystone

486DX, 33 MHz, 8K cache.
486DX base IBM PS/2 Model 55SX (16 MHz).

\$269*

(Better Price)



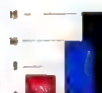
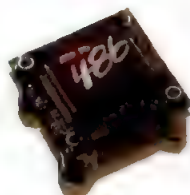
Cost per Dhrystone difference between 386SX and 486DX = \$0.21 per Dhrystone

Cyrix 486SX2, 16/32 MHz installed in an IBM® PS/2 Model 55SX (16 MHz).

\$269*

\$399*

(Best of both)



Cost per Dhrystone difference between 386SX and 486DX = \$0.05 per Dhrystone

Evergreen REV 70 486™, T1 20/40 MHz installed in an IBM® PS/2 Model 55SX.
*REV 70 486, IBM 16/48 MHz in a 55SX.

REV 70 486 processor upgrades for 286, 386SX and 386DX computers!

Distributors: DataLink NW (800) 544-1720, GSA® GS00K-93-AGS-6304

Treasure Chest (800) 677-9781, FAX (504) 461-8095

Brentwood Bus. Syst. (800) 431-8542, FAX (303) 431-6647

Evergreen
Technologies

CIRCLE 754 ON READER SERVICE CARD

DON'T BE OUT OF TOUCH!
Talking Technology has multi-line voice and fax processing systems so you can stay in touch with your world.

For Sales and
Technical Information Call:
1-800-945-4884

Demo: 1-510-522-3800 ext. 120

Complete multi-line
packages start at **\$699!**

TALKING TECHNOLOGY, INC.

CIRCLE 755 ON READER SERVICE CARD

Little Star™
NEW 30 I/Os \$195

Newest in Z-World's line of C-programmable miniature controllers, the Little Star™ has 16 inputs, 14 high-current driver outputs, RS232/485, digital battery-backed RAM and real-time clock, programmable timers, watchdog, and more. The Little Star is also available with enclosure and LCD/keypad, expansion cards for additional I/O, and optional 18 MHz clock. Our easy-to-use, yet powerful Dynamic C™ development system (\$195) integrates an editor, compiler, and debugger. The Little Star is ideal for control, test and data acquisition applications

ZWORLD
ENGINEERING

1724 Picasso Ave
Davis, CA 95616
916 757 3737
916 753 5141 FAX

24-Hour AutoFAX
916 753 0618
Call from **your FAX**
Request catalog #18

CIRCLE 757 ON READER SERVICE CARD

Convert your obsolete
MEMORY FOR \$8.50/MEG

4 MEG FROM 1 MEG!
4 MEG from 1 MEG 3 chip SMT SIMMS \$34.00
Call on converting any type of surplus memory!

NEW PRODUCTS FOR 1994:

Socketed 1 MEG DIP boards (no soldering required)	\$16.00
Unsocketed 1 MEG DIP board (soldering required)	\$ 8.50
1 MEG from 256K 3 chip SMT/DIP SIMM	\$13.50
SIP to SIMM adapter boards	\$10.00
1 or 2 MEG 72-Pin SIMM conversion	\$16.00/\$32.00
4 or 8 MEG 72-Pin SIMM conversion	\$24.00/\$48.00

AUTOTIME 24 hour AutoFAX: (503) 452-0208
6605 SW Macadam - Portland, OR 97201 Ph: (503) 452-8577 Fax: (503) 452-8495

CIRCLE 756 ON READER SERVICE CARD

DOS

FREE ISSUE! Inside DOS is guaranteed to help you get the most out of DOS. But don't take our word for it. See for yourself.

Subscribe today and you'll get 13 issues for the price of 12 for only \$39! If you decide *Inside DOS* is not for you, mark "cancel" on your invoice and return it. Your free bonus issue will be yours to keep with no further obligation.

Call for your **FREE ISSUE** today!
1-800-223-8720
Please mention code **VSNT**

PC-COMPANION Plus™

Add a second keyboard, monitor and mouse to your PC up to 250 feet away!

- Supports PC/AT, PS/2 and 100% compatibles
- Combine monochrome and color VGA monitors
- Mouse support available at both local and remote workstations
- Switch selectable privacy mode



For Macintosh support, ask about our new **Mediator™ for Macintosh!**

Cybex Corporation
4912 Research Drive • Huntsville, AL 35805 USA
(205) 430-4000 • FAX (205) 430-4030

CYBEX™

PC/AT and PS/2 are registered trademarks of IBM Corporation. Macintosh is a registered trademark of Apple Computer, Inc.
Dealer Program Available

Made in USA

CIRCLE 758 ON READER SERVICE CARD

PC-EXTENDER PLUS™



Extend the distance between your PC and a keyboard, VGA monitor and mouse up to 250 feet!

- Supports PC, PC/XT, PC/AT, PS/2 and 100% Compatibles
- Supports monochrome or color VGA monitors
- Offers conversion from RGB color to gray-scale
- PS/2 style or Microsoft/Logitech serial mouse support available

PC-COMPANION PLUS™



Add a second keyboard, monitor and mouse to your PC up to 250 feet away!

- Supports PC/AT, PS/2 and 100% Compatibles
- Combine monochrome and color VGA monitors
- Mouse support available at both local and remote workstation
- Switch selectable privacy mode

IBM, PC, PC/XT, PC/AT and PS/2 are registered trademarks of International Business Machines Corporation. Microsoft and Logitech are registered trademarks of their respective companies.



4912 Research Drive • Huntsville, AL 35805 U.S.A.
(205) 430-4000 • FAX (205) 430-4030
Dealer Program Available Made in USA

CIRCLE 750 ON READER SERVICE CARD

REMOTE POWER ON/OFF

\$169.95

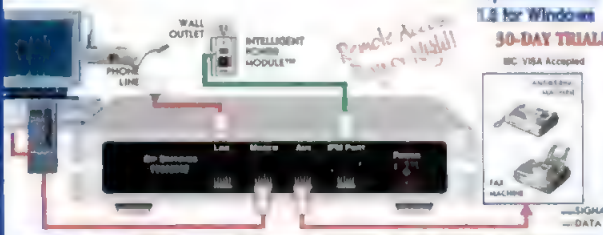
- Power on your PC from anywhere in the world!
- Reboot a Locked-up Remote PC.
- Share a Modem & Fax Machine on a single phone line

\$199.95

w/pcANYWHERE
1.5 for Windows

30-DAY TRIAL

IBC VISA Accepted



Server Technology • 1288 Hammerwood • Sunnyvale, CA 94089 • Ph: 408-745-0300 • Fax: 408-745-0392

TO ORDER CALL 1-800-835-1515

CIRCLE 760 ON READER SERVICE CARD

100MHz PowerBrick

Good News... Travels Fast!

For no compromise on-the-go use, the PowerBrick is the fastest, most capable notebook available. Enjoy blazing performance with the latest 100MHz 486DX4 CPU and the mobility of a light 6lb. PC. Other features include 4MB RAM, 100MB hard disk, 28.8Kbps modem, and a 15" color display.

The PowerBrick is the perfect solution for anyone who needs a portable computer that can handle the most demanding tasks. It's the only notebook that can run Windows 3.11 and Windows NT. It's the only notebook that can handle the most demanding tasks. It's the only notebook that can handle the most demanding tasks.

from \$2,595

4-Year GE Service Warranty Included

Other NoteBricks
The SubBrick

486SX/25, 4MB RAM, 120MB HDD, Trackball, Mouse, 10" LCD Display, 5.5 Lbs., PCMCIA II Slot
\$1,495

The NoteBrick 33

486DX4/33, 4MB RAM, 120MB HDD, Trackball, Mouse, 10" LCD Display, 5.5 Lbs., PCMCIA II Slot
\$1,395

Call M-F, 9-6 EST
800-633-1925

24 Hr. Automatic FAX Info
800-723-0778
code 1480

One Intercontinental Way, Peabody, MA 01960 (508) 535-7510 FAX: (508) 535-7512

CIRCLE 762 ON READER SERVICE CARD

AWESOME !!!



Mono \$1295
Color \$1795



\$1795

Just Imagine Computer Inc.
Me USA NB Canada Est 1983
1-800-363-8180

CIRCLE 761 ON READER SERVICE CARD

COMMUNICATIONS-COMPUTER SYSTEMS

PREMIER

Crammed into your laptop?

Up to 42 GB
for laptops —
up to 520 MB
for notebooks!

Are you outgrowing your laptop or notebook's capacity? Tired of software "quick fixes"? Now you can get the storage you need to effectively operate today's data-intensive applications and operating systems. Up to 520 MB for notebooks. LSI specializes in internal upgrades. We can replace the fac-

tors-original hard drives in Toshiba, Compaq, and other major manufacturers' laptops and notebooks with higher-speed, higher-capacity drives without adding bulk or weight. If you're feeling the application squeeze, call us. You'll be surprised how much room there is in your laptop...



(800) 683-6839
Laptop Solutions, Inc.

10700 Richmond Ave., # 114 • Houston, Texas 77042
Local: (713) 789-0878 • FAX: (713) 789-8177

All product names are trademarks or registered trademarks of their respective owners.

CIRCLE 763 ON READER SERVICE CARD



Save Money, Save Energy

Energy-Saver for PC Peripherals



Only
\$69.95*

* Suggested Retail Price

It's easy! Works like a screen saver! Simply connect Green Keeper to the keyboard of any IBM-AT compatible. Plug in your monitor and other peripherals, set the inactivity period with the DOS or Windows software, and Green Keeper will turn them off automatically. Touch a key or the mouse to restore power. It doesn't interfere with your CPU!

It's economical! \$69.95 converts your existing computer into an energy saving computer. Green Keeper can pay for itself in less than a year. No hefty investments in new hardware.

It's ecological! Green Keeper uses environmentally friendly materials and is Energy Star Compliant.

Call (815) 434-0848
FAX (815) 434-7094



B-E electronics
4000 Baker Rd. PO Box 1040M
Ottawa, IL 61360

CIRCLE 765 ON READER SERVICE CARD

NEW

KEEP YOUR MOUSE IN A SAFE TRAP!



- DE LUXE MOUSE HOLDER
- EXCLUSIVE DESIGN IN BLACK ACRYLIC OR NATURAL WOOD
- DIRECTLY FROM THE MANUFACTURER
- THE PERFECT GIFT FOR EVERYONE

ORDER **9.99** ONLY
TODAY

ADD \$3 FOR HANDLING & SHIPPING

SEND MONEY ORDER OR CHEQUE TO:

PYXIS INNOVATION
217 SOUTH UNION STREET, DURLINGTON, VERMONT 05401
1-800-774-TRAP

CIRCLE 766 ON READER SERVICE CARD

Three for the show.



BOXLIGHT 1280. \$2,299

Affordable color!

- 4,913-color palette
- PC and Mac compatibility
- Rear-screen projection capability
- Simultaneous monitor viewing

BOXLIGHT 2080. \$3,999 **BOXLIGHT 1337. \$2,999**

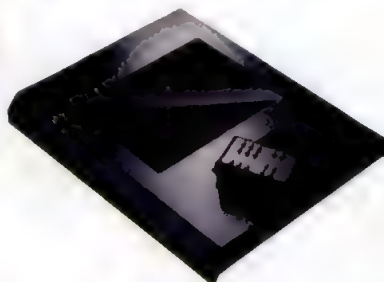


All-in-one!

- 4,913-color palette
- Optional wide-angle lens
- FREE carrying case
- Rear-projection capability

Price performance!

- VGA or MAC cables
- Simultaneous monitor viewing
- Lightweight aluminum body



BOXLIGHT: Your direct source for all the bright answers.

- More than 50 models in stock
- Instant availability
- Overnight shipping
- 30-day guarantee
- Expert technical support

No one else offers the one-stop shopping... the selection... the value... the immediate delivery... and the knowledgeable service and support you get from the projection panel experts.



BOXLIGHT®

1771 Ford Dr. N.E., Poulsbo, WA 98370 • 206-779-7901
Payment: VISA, MasterCard, American Express, C.O.D. and Purchase Orders (some restrictions). Leasing and rental options available. 30-Day Money Back Guarantee.



Call today 1-800-762-5757

CIRCLE 764 ON READER SERVICE CARD



ONLY ONE THING COULD BE EASIER THAN OUR BAR CODE PRINTING SOFTWARE.

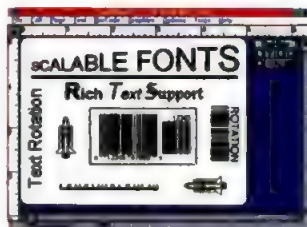
StrandWare offers you a full line of easy to learn, easy to use bar code printing software packages. In less than an hour, you can be printing most popular bar codes with virtually any printer. We also offer Bar Code Library, which lets you print bar codes from within your own programs. Call (800) 552-2331 or fax (715) 833-1995.

StrandWare
For Anyone Who's Keeping Track

CIRCLE 787 ON READER SERVICE CARD

The Next Generation in Label Design Software

LabelWorks™ for Windows



LabelWorks sets the new performance standard for professional quality label design. No other program combines such easy operation with this much power!

- Provides Desktop Publishing features to enhance label design. Features include: WYSIWYG, rulers, guides, page zooms, lines, shapes.
- Rich text support allows you to edit font styles, types, and sizes within the same line.
- Supports all major Bar Code symbologies, including Code 39, 93, 128, POSTNET, UPC, Bookland EAN. 19 types in all.
- Imports & Exports using TIFF, GIF, BMP, PCX, WPG, WMF, TARGA graphic files.
- Rotates Text, Bar Codes and imported graphics in 90 degree increments.
- Prints labels on virtually any windows supported printer.
- Prints labels directly from dBase, DIF & ASCII files.

Dealer Inquiries Welcome.

Call for Free DEMO Software

AMERICAN MICROSYSTEMS
2190 Regal Parkway, Euless, TX 76040

(800) 648-4452 (817) 571-9015 FAX (817) 685-6232

9-TRACK FOR PCs



Mainframe To PC Data Interchange

Rock solid solutions, rock bottom prices.

Direct from the manufacturer. 1600/3200/6250 bpi.

- The most trusted name in 9-track, since 1980
- Powerful, easy-to-use software tools included

Overland Data Inc.
800-729-8725

TEL 619-571-5555
FAX 619-571-0982
EUROPE:
TEL (+44) 734-891891
FAX (+44) 734-891897

Ask about 3480 with IDRC.

CIRCLE 788 ON READER SERVICE CARD

New Products Featured Award-Winning Tape System Family

NOW all of the PCTD-1 features that earned PC Magazine recognition as "Editor's Choice" and "the clear winner among nine-track back-up devices" are available with a complete line of NineTrack 3480/3490 SCSI Controller Kit and tape subsystem solutions. Like the PCTD line, the new SCSI line reads/writes to 9-track and 3480/3490 tape with your IBM PC/XT/AT 386 486 PS/2 and compatibles. Exchange data with other PCs, minis and mainframes using a variety of tape densities.



3480/3490 (IDRC) & NineTrack system features:

- Auto & cartridge-load systems
- Data transfer rate up to 43.56 MB/minute
- Interchange & backup software
- Real-time data extraction & conversion software
- 800-1600/3300/6250 bpi & 3480/3490 IDRC systems available
- Top-free direct access to dedicated product line technical support



800-828-0599

Fax 216-349-8609

CIRCLE 787 ON READER SERVICE CARD

Do-It-All Portable Disk For Home, Office & Travel Computing!

Compact, Plug N' Play with Any PC

Simply plug units into any portable or PC parallel printer port and you're ready to go!

Unlimited Storage - Great Backup & More!

Work with two hard drives. Also ideal for data transport, data security and privacy.

FAX (408) 437-9333

1-800-973-VALU



**Mobile Disk
120/240MB* \$299.**

A complete ready-to-go handheld hard drive. Call for higher capacities, battery & OS/2 models!

**Portable 128/256MB*
Rewritable
Optical Drive \$899.**

Optical disk an ISO standard is the most reliable, rugged and low cost removable mass storage!

**Extra! 512MB 1GB*
Optical Disk (4 disks) only \$99.**

plus a Lifetime Warranty

**Portable 21/42MB*
Floptical
Drive \$399.**

Rugged 3.5" 21MB floptical drive. Read/write regular 720K 1.44M floppies too!

**Extra! 21-42MB* Floptical
diskettes only \$13.95**

CIRCLE 788 ON READER SERVICE CARD

Will your 9-Track Subsystem...



- ✓ Offer tape speeds from 100 to 150 ips?
- ✓ Read and Write all four 9-Track Densities?
- ✓ Work in concert with other SCSI-2 devices?
- ✓ Be backed by a company who has produced 9-Track drives for over 20 years?

Features like these make **M4 Solutions** the only choice for your demanding high performance applications.

....3480/190 Solutions also in-stock

M4

10855 Sorrento Valley Rd. San Diego, CA 92121
619-597-0510 Fax: 619-597-0630

M4 Solutions

800-240-8270

8 AM Eastern to 5 PM Pacific

CIRCLE 788 ON READER SERVICE CARD

MAY 17, 1994 PC MAGAZINE 375

BEST 9-TRACK TAPE SOLUTION OF THE 90'S!



- PC 286/386/486
- RISC/6000 • AS/400
- SUN • HP • DEC • APPLE

*Our name begins with Quality!
Call us today for
price and information.*

QUALSTAR®

6709 INDEPENDENCE AVE., CANOGA PARK, CA 91303
FAX (818) 592-0116 • (818) 592-0061

CIRCLE 770 ON READER SERVICE CARD

3480/3490 9 TRACK

WINDOWS DOS NOVELL OS2 UNIX

WINDOWS TAPE SOFTWARE!
TAPE BACKUP
TAPE DUPLICATION
TAPE CONVERSION



Featuring Fujitsu Quality Products!

LAGUNA DATA SYSTEMS

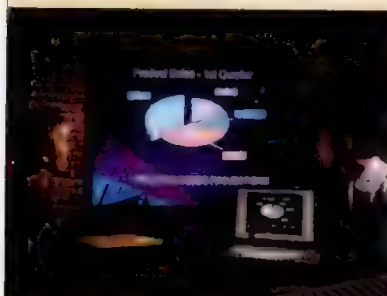
7340 Smoke Ranch Road Suite C, Las Vegas, NV 89128
TEL: (702) 254-2648 FAX: (702) 254-0910

800-938-TAPE

CIRCLE 771 ON READER SERVICE CARD

Connect Your PC to any TV...

The Compact PC Presentation Solution



\$349

Available with Asymetrix Computer for \$399.
Supports DOS, Windows, and OS/2

FREE Electronic Marker Software by Consumer Technology

The Presenter Plus/2 —
When your presentations count!

800/356-3931



CONSUMER TECHNOLOGY

The Presenter Plus/2 turns your PC into an incredible presentation machine. Easy plug-and-play external hook-up makes group presentations much more efficient and certainly less expensive. Print to video tape so others can share your presentation. Forget carrying heavy equipment to your presentation. That's history. Why d'm the rights? That's for overhead projectors also history. So, with your PC and The Presenter Plus/2 in your briefcase use the available TV and you're ready for that Academy Award performance.

For questions and a dealer nearest you call us at 800/356-3931
Fax: 503/356-1100

© 1994 Consumer Technology, Inc. All rights reserved. All trademarks are the property of their respective holders.



Your Best CDROMS!

- Cica MS Windows CDROM 4000 new Windows programs - quarterly updates
- Giga Games CDROM 3000 hot Games for MSDOS and Windows
- Space and Astronomy CDROM Thousands of NASA images and data files
- C User Group Library CDROM A collection of user supported C source code
- Simtel MSDOS CDROM Classic 650 MB Shareware / Freeware for MSDOS
- QRZ! Ham Radio CDROM FCC Callsign Database for Win & DOS + files
- GIFs Galore CDROM 6000 mostly 640x480 GIF Images in every category
- Gutenberg Project CDROM Classic Literature and historical documents
- Hobbes OS/2 CDROM 600 MB always current Shareware/Freeware for OS/2
- Source Code CDROM 650 MB of unix & DOS source code for programmers
- Internet Info CDROM Thousands of computer, net, and internet documents
- XI/AGNU CDROM X Windows and GNU software for Unix and SPARC
- Aminet Amiga CDROM 650 MB new Shareware/Freeware for Amiga
- GEMINI ATARI CDROM 650 MB 3000 Programs for Atari - also for BBS use
- Ada CDROM Programming tools, Ada source code and docs
- Nova for NeXT CDROM 600 MB black NeXT app's, src., docs, etc
- Nebula for NeXTSTEP Intel 600 MB NeXTSTEP Intel app's, docs, etc
- Garbo MSDOS/Mac CDROM MSDOS and Macintosh Shareware/Freeware
- Fractal Frenzy CDROM 2000 high resolution fractals - royalty free
- FreeBSD CDROM Berkeley BSD, 32bit O/S for PC, w/ GNU & X11. Src
- Linux CDROM Yggdrasil Linux, 32bit O/S for PC, w/ GNU & X11. Src
- La Coleccion CDROM MSDOS, OS/2, Windows. Spanish descriptions
- Sprite CDROM Berkeley's experimental Distributed OS for Sun
- CDROM Caddies Standard type, highest quality, Lifetime guarantee!

* Shareware programs require separate payment to authors if found useful

T-800-786-9907

+1 510 674-0783

Email: orders@cdrom.com

Fax +1 510 674-0821



All these CDROMs are unconditionally guaranteed!

Walnut Creek CDROM

4041 Pike Lane, Suite D-512
Concord, CA 94520



Dealer Inquiries Welcome

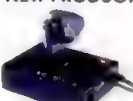
CIRCLE 772 ON READER SERVICE CARD

What Do PC Jet Jockeys Want?

Hair-Raising Sorties
Death Defying Maneuvers
Heroics
Victory
Realism
HOTAS™

ThrustMaster® Controls

NEW PRODUCT



Mark II WCS™ (Throttle)



FCS™ (Joystick)

RCS™



(Rudder Pedals)

10150 S.W. Nimbus Avenue, Portland, OR 97223-4337
Phone (503) 639-3200 Fax (503) 620-8094

CIRCLE 773 ON READER SERVICE CARD

Replace Synth Envy Without Replacing Your Sound Card!

Only \$199!

**IN THE BEGINNING,
WE CREATED THE FIRST 16-BIT
WINDOWS SOUND CARD.
THEN THE FIRST
WAVETABLE SYNTHESIZER
FOR WINDOWS MULTIMEDIA.
NOW, OUR LATEST FIRST
LETS YOU CUSTOMIZE YOUR
SYNTHESIZER FOREVER...
INTRODUCING
TURTLE BEACH MAUI
WITH SAMPLESTORE!**

You've suffered through the "Heartbreak of FM Synthesis." Now's the time to add Turtle Beach quality to your existing sound card. Maui™ delivers 128 crystal clear wavetable instruments — perfect for multimedia presentations, General MIDI music software, and Windows and DOS games...all for half the price of a Roland, MediaVision, or Creative Labs wavetable sound card.

We've also added SampleStore™ — 256K of sample RAM, so you can take any existing Windows wave file, load it into



Maui, and then play it back like any other MIDI instrument. SampleStore is also upgradeable to 8 megs of RAM, which means adding hundreds of your own samples to Maui is a snap. See your favorite dealer, or call 800 845 5840 for more information.



TURTLE BEACH SYSTEMS

52 Grumbacher Road • York, Pennsylvania 17402 • 717-767-0200 • FAX: 717-767-6033

All trademarks are registered by their respective companies.
Specifications may change without notice.

TV Elite. Big-Screen Multimedia Presentations Made Easy.

Just connect TV Elite to a VGA card and any TV and presto!...big-screen presentations. It's that simple.

Compare TV Elite's features to any of the alternatives (all unwieldy and costing up to 10 times as much), and you'll see—there simply is no other choice.

FREE! With every TV Elite, you get "Compel PE". And you get "Presentation Tools" software—with 3 great presentation features.

Advanced Digital Systems

Call (800) 888-5244, 8am-6pm M-F Pacific Time
13909 Bettencourt St • Centos, CA • 90701 • (310) 926-1928 • (310) 926-0518 (Fax)

TV Elite.
Easily the Best.

FEATURES
640x480 resolution
16.7 million colors
Flicker-free video
Light weight



CIRCLE 775 ON READER SERVICE CARD



We Project Your Promotion

For the latest in color projection panels and projectors call the experts in LCD technology. Your satisfaction guaranteed or your money back.

SALES • LEASES • RENTALS

Panelight
101 The Embarcadero Ste. 100-A, San Francisco, CA 94105
Hours: 9:30 to 5:30 PST 9:30 to 8:30 EST
VOICE 415 772 5800 FAX 415 986 3817

CIRCLE 776 ON READER SERVICE CARD

CD-ROM Networking Servers

- Multi-protocol
- Multi-network
- LanCD™ CD-ROM networking software
- License metering
- FastCD™ - SCSI cache
- Remote management
- Memory cache
- 255 drive support
- 100 concurrent users
- FULL ONE-YEAR WARRANTY

LOGICRAFT
A Subsidiary of INS

1-800-880-5644

© 1994 Logcraft, Inc. • 22 Cotton Road • Nashua, NH 03063

CIRCLE 777 ON READER SERVICE CARD

CONTROL ALL YOUR PC SERVERS

FROM ONE KEYBOARD AND MONITOR

COMPARE QUALITY AND PRICE PERFORMANCE

• Save Space, Cut Costs & Centralize Control With 100% Reliability

• "Plug and Play" Any Mix of PC/ATs & PS/2s, All Video

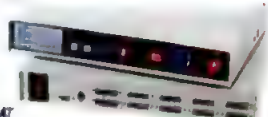
• Desktop or 19" Rackmount Models for 2, 4, 8, 16 PCs, Expand to 64

• Keyboard Emulator for Error Free PC Autoboot and PC Operation

• AUTOSCAN™ to Monitor All PCs

• PS/2 & Serial Mouse Support

• Thousands in Use Worldwide
GSA Schedule for U.S. Federal Govt
30 Day Money Back Guarantee



SEE US AT
COMDEX
BOOTH #44974

CALL TODAY!
(908) 874-4072 x81

RARITAN COMPUTER, INC. 10-1 Ilene Court, Belle Mead, NJ 08502 FAX (908) 874-5274

Germany - Elcom Computer Technik
Japan - Prodata Corporation
Taiwan - Harbin Computer Taiwan, Inc.
The Netherlands - Arcturus B.V.
United Kingdom - Kerntron LTD

Tel: 49-321-689877
Tel: 81-3-3254-6131
Tel: 886-2218-1117
Tel: 31-10443-3313
Tel: 44-244-336123

Fax: 49-321-689923
Fax: 81-3-3254-6134
Fax: 886-2218-1221
Fax: 31-10443-3443
Fax: 44-244-331043

For list of American and Canadian dealers contact RCI (908) 874-4072

CIRCLE 778 ON READER SERVICE CARD

**NEW
Version**

Automatic Network Diagramming for Novell NetWare® with Nodemap™ 2.0

Here it is... the answer to every network administrator's prayers! You have to see it to believe it! Nodemap 2.0 is the easiest and fastest program for creating and modifying Novell NetWare® network diagrams. It gives you the power to create network diagrams of all types and sizes. Nodemap's unique network detection capability allows you to printout all or just parts of your network. If your network changes, no problem; Nodemap has a host of powerful editing features. You get a complete library of standard network and telecommunication shapes and you can create your own shapes with Nodemap's shape editor. With support for over 270 output devices (including most plotters) and a host of time saving features you can't go wrong. Give it a try! Nodemap 2.0 comes with a 60-Day Money-Back Guarantee and FREE, no-wait technical support.

See your dealer today or call:

1-800-267-0668 ext.49

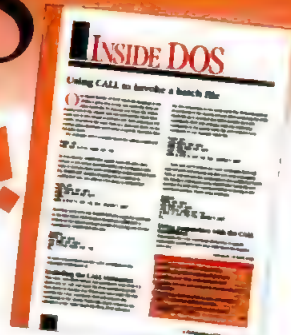
HavenTree
SOFTWARE

P.O. Box 470-P, Finisview, NY 13640-0470
Tel: 613-544-8035 Fax: 613-544-9632 InfoFax: 613-544-2049

yes
It runs with
NetWare
Developer limited only
Novell makes no warranties
with respect to this product

CIRCLE 779 ON READER SERVICE CARD

**DOS
FREE
TIPS!**



Inside DOS will show you how to use DOS

more productively. You'll find timesaving shortcuts, proven methods, and step-by-step instructions in every information-packed issue. ♦ Subscribe today and we'll send you 13 issues for the price of 12 for only \$39! If you decide *Inside DOS* is not for you, mark "cancel" on your invoice and return it. Your free bonus issue will be yours to keep with no further obligation. ♦ *Inside DOS* is guaranteed to help you get the most out of DOS. But don't take our word for it. See for yourself.

Call for your FREE ISSUE today!

1-800-833-8730

Please mention code V5NX

**THE LEADING PC MAGAZINES AGREE:
PhoneDisc® is the fastest way
to find anyone, anywhere!**



Say farewell to 411. Sayonara, 555-1212. Hello, **PhoneDisc® USA** – the fastest way to find anyone, anywhere. It's the award winning nationwide CD-ROM telephone directory named one of *PC Computing's* top two business CDs; one of *PC World's* top twenty-five. No other CD phone directory made the grade.

RESIDENTIAL \$79 Find 80 million numbers, addresses, even zip codes in a fraction of the time, and at a fraction of the cost of directory assistance calls. Download, print and dial.
BUSINESS \$79 Identify 9.5 million business names from just a phone number or street address; business type or SIC code.
REVERSE \$249 The master investigative tool.™ Developed for government agencies. Features include search by number and address of every residential and business listing on five regional discs.

TO ORDER CALL NOW!

1-800-284-8353

PhoneDisc® USA

Digital Directory Assistance, Inc.
6931 Arlington Rd., Suite 405
Bethesda, MD 20814-5231

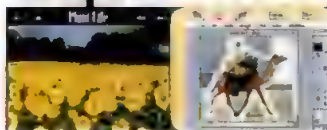
The fastest way to find anyone, anywhere!

CIRCLE 783 ON READER SERVICE CARD

Improve The Look Of Your Work With Creative Photos + Usage Tips!



Graphic Photos



Scenic Photos

To order contact a dealer or call 201-808-1992

**InPrint Art Library
Vol 2 - 2 CD-ROMs**

202 color images with FULL USAGE RIGHTS and really ROYALTY FREE. Plus Interactive on-screen tips and tutorials on how to best use these creative images.

**Only \$59.95 for
this 2 CD set**

Other Allegro CD-ROM Titles:
Volume 1: Graphics Textures & Cartoon Idioms
PC Library - 30 Interactive PC Manuals
Multimedia Business 500 - Company Profiles
Business Library - 12 Top Reference Books
The Clinton Health Security Plan
What It Means: What It Costs

**ALLEGRO
NEW-MEDIA**

PREMIER

DOS

**FREE
ISSUE!**

Inside DOS is guaranteed to help you get the most out of DOS. But don't take our word for it. See for yourself.

Subscribe today and you'll get 13 issues for the price of 12 for only \$39! If you decide *Inside DOS* is not for you, mark "cancel" on your invoice and return it. Your free bonus issue will be yours to keep with no further obligation.

Call for your FREE ISSUE today!

1-800-223-8720
Please mention code V5NY

Error-Free Duplication

- High quality 3.5" & 5.25" color diskettes.
- Custom packaging & silkscreening.
- Warehousing & order fulfillment.

*GenTech's exclusive
dual verification
guarantees data integrity...*



**GENTECH DUPLICATION
SERVICES**

**Call Toll Free...1-800-255-3999
or FAX (801) 255-7555**

CIRCLE 783 ON READER SERVICE CARD

"ADS markets VGA → TV Elite.
Our target audience is
business professionals
who use computers for
presentations at meetings.
The buyer needs some
computer savvy and
PC Magazine's Premier
audience has proven to be
very knowledgeable."

**"I want
to create
sales.
And**

"It's not just that we get more leads from PC Magazine Premier— you expect that, given its large readership. It's that the Premier leads are better because of PC Magazine's better reach into the business market. We've increased our frequency to every issue.

*"PC Magazine Premier works.
I want to create sales.
And that's what Premier does.*

—Mike McCoy, President
Advanced Digital Systems

**that's
what
Premier
does!"**

PC Magazine Marketplace
Nothing comes close!

1-800-825-4237



BUSINESS APPLICATIONS

Windows Training for Corporate Users

KeyStone Videos will teach your staff in Windows...

Your Personal Windows



Video Training Specialists



Dawn Bjork
Corporate Trainer
& MS Word Instructor



James Meyer
Windows Professor
& MS Project Instructor



Alison Batten
Corporate/Government Trainer
& Borland Instructor



Dave Bellamy
MS Excel Specialist
& MS Project Instructor



Jeanie Johnson
Certified WordPerfect Trainer
& WordPerfect SDO Instructor



Russell Eubanks
MS Certified, Visual Basic
Developer and Trainer

Word 6.0

Beginning	\$49.95
Intermediate	\$49.95
Advanced	\$49.95
Any Two Videos	\$89.95
All Three Videos	\$129.95
2.0 to 6.0 Upgrade	\$49.95

Access 1.1

Beginning	\$49.95
Intermediate	\$49.95
All Three Videos	\$134.95

Quattro Pro 5.0

Beginning	\$49.95
Intermediate	\$49.95
Advanced	\$49.95
All Three Videos	\$129.95



Excel 5.0

Beg/Int/Adv	(ea) \$49.95
Any Two Videos	\$89.95
All Three Videos	\$129.95
4.0 to 5.0 Upgrade	\$49.95

WordPerfect 6.0.0

Beginning	\$49.95
Intermediate	\$49.95
Advanced	\$49.95
Any Two Videos	\$89.95
All Three Videos	\$129.95
5.2 to 6.0 Upgrade	\$34.95

Visual Basic 3.0

Unit 1	\$89.95
Unit 2	\$89.95
Unit 3	\$89.95
All Three Videos	\$274.95



Average 1 hour & 45 minutes of instruction per video

Windows 3.1

Beginning	\$49.95
Advanced	\$49.95
Beg/Adv Set	\$89.95
DOS & Win Basics	\$49.95

Paradox 4.5

Beg/Int/Adv	(ea) \$49.95
All three Videos	\$129.95

CorelDRAW 4

Beg/Int/Adv	(ea) \$59.95
All Three Videos	\$149.95



Project 3.0

Level 1/2/3/4/5	(ea) \$74.95
All Four Videos	\$299.95

PowerPoint 3.0

Beginning	\$49.95
Advanced	\$49.95
Beg/Adv Set	\$89.95

Video Combinations

Microsoft Office	\$289.95
Microsoft Office Pro	\$495.95
Microsoft Office Plus	\$879.95
Borland Office	\$349.95
Borland Office Lite	\$239.95

Shipping \$2.00 for the first two video orders, plus \$1.00 for each additional video title. International shipping additional.



3 Easy Ways to Order:



C.O.D., Company P.O. or Checks

CALL 1-800-748-4838
8 0 1 - 3 7 5 - 8 6 8 0

FAX 1-801-373-6872

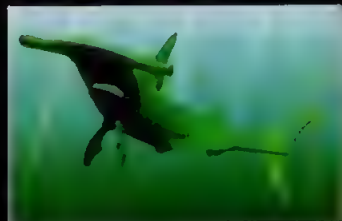
MAIL

KeyStone Learning Systems
125 E. 300 S., Suite 205
Provo, UT 84601

CIRCLE 785 ON READER SERVICE CARD

Multimedia Starts Here

From game development to broadcast quality animations, StrataVision 3d PC has what you need. Advanced modeling tools guarantee precise object creation and manipulation. Use sophisticated animation effects like Morph, Twist, and Page turn to create sizzling Hollywood-style movies. Render it all with remarkable speed and photorealistic quality. Call now to get started:



1-800-STRATA 3D
STRATA

CIRCLE 786 ON READER SERVICE CARD

THE BEST IMAGE FILE MANAGEMENT SYSTEM. PERIOD.



LEADVIEW 3.0 for Windows

"...you'll be hard-pressed to find more bang for your graphics-utility buck."

For more information, call
1-800-637-4699

LEAD Technologies, Inc.
Charlotte, NC 28268

PC Magazine, March 1994

CIRCLE 787 ON READER SERVICE CARD

Create a Multimedia Presentation in 60 Minutes... GUARANTEED.



SUPER KNOW & TELL

Now you can create a multimedia presentation in one hour! SST maximizes Windows 3.1 and lets you produce dynamic presentations complete with scrolling text, sound effects, narration, graphs, pictures, live motion video - even interactive capabilities. SST works like a slide carousel and a VCR player. It features easy-to-learn point & click and drag & drop controls. Plus, it utilizes two revolutionary operating techniques that no longer require you to learn complicated script languages or deal with time-based editing systems. It's the easy way to get into the multimedia action and make your presentations soar! **Satisfaction Guaranteed.** Create a multimedia presentation in sixty minutes or return for a refund. Call for details and limitations.

suggested retail price
\$149.95



7100 Northland Circle, Suite 401
Minneapolis, MN 55428
FAX (612) 531-0645



1-800-879-7899



1-800-637-4735



1-800-745-3634

CIRCLE 788 ON READER SERVICE CARD

"EDITOR'S CHOICE"

Electronic Musician—Jan. 1994

"BEST OF SHOW"—FALL COMDEX '93

Frederic Davis: PC Radio

NOMINATION—MOST INNOVATIVE SOFTWARE

Music and Sound Retailer Award—1994

MIDISCAN
FOR WINDOWS**NOW! Version 1.1**

MIDISCAN is a TIFF in/MIDI-out converter transforming printed sheet music into multi-track MIDI files within minutes after scanning. Notes, accidentals, rests, ties, clefs, and signatures are all recognized. View, scroll, and edit the reconstruction on-screen as standard notation along with the original image. Play back converted MIDI files through any sequencer/notation software. Demo \$10 or free on Compu-Serve (MIDI B Vendor Forum—Musitek Library) \$379 retail

1-800-676-8055

CIRCLE 789 ON READER SERVICE CARD

**COMPLETE BIBLE BOOKSTORE
ON DISK!****JUST DIAL****1-800-423-1228**

FOR YOUR

Free Catalog!**BIBLE RESEARCH SYSTEMS**

2013 WELLS BRANCH PKWY. # 304 • AUSTIN, TEXAS 78726

**VIRUS
ALERT**

Introducing PC DEFENDER, the most complete anti-virus solution from the creators of the industry standard AMIBIOS. We've created the only hardware and software anti-virus package in its price range. PC DEFENDER

protects your system from contamination before, during, and after booting. PC DEFENDER comes with the Boot Monitor Card that protects your system from boot viruses, such as Michaelangelo, Azusa, Stoned, and others. The Illegal Activity Monitor protects you from viral activity WHILE YOU WORK! And, the Anti-viral Maintenance Utility allows you to scan, clean, and immunize your files, protecting you from any future corruption. With immunization, PC DEFENDER checks for corruption before your file executes. Suspect virus activity taking place? Get real protection ...get PC DEFENDER.

Sales: (800) 892-6692

Fax: (404) 263-9381

Tel: (404) 263-8181

Fax Back: (404) 246-8787

American
Megatrends

CIRCLE 791 ON READER SERVICE CARD

The "Most Innovative" Software Of 1993 Is Also The Most Useful.

Plug in to **POWER TRANSLATOR™** from Globalink®, the software package named "the most innovative of 1993" by *Discover Magazine*.

POWER TRANSLATOR features speeds up to 100 times faster than human translators, easily-updated dictionaries of over 250,000 words and phrases, and a 90%-plus accuracy rate!

Now, getting grammatically-correct translations of words, phrases or entire documents in Spanish, French or German to/from

English is as easy as the push
of a button.

Find out about
the software package
that's got *Discover Magazine*—and a lot of
other people—talking. Call Globalink today
and ask about **POWER TRANSLATOR**, your
ticket to world-wide communication.

**Globalink, Inc.**

9302 Lee Highway, Fairfax, VA 22031-1208

Int'l.: 1-703-273-5500

Fax: 1-703-273-3888

1-800-255-5660

U.S. and Canada

CIRCLE 790 ON READER SERVICE CARD

MAY 17, 1994 PC MAGAZINE **381**

Recognized as the TWO BEST
PC-diagnostic tools on the market.

POST-PROBE

1ST EVER UNIVERSAL POST CARD FOR ALL PC!

SERVICE NEWS
PRODUCT OF THE MONTH

The only "Power-On Self Test" card you need to debug any "dead" PC!

- LOGIC PROBE— includes tri-state probe to determine actual chip failures.
- MICRO-CHANNEL COMPATIBLE — card works with all architectures: ISA, EISA, and Micro-Channel.
- DETAILED MANUAL— includes chip layouts and detailed POST procedures for all major BIOS's.
- EASY-TO-READ LED P.O.S.T. HEX DISPLAY — all codes available in the newly revised manual.

Micro-Scope

UNIVERSAL DIAGNOSTICS SOFTWARE

PCUPGRADE
PRODUCT OF THE MONTH

Fully operating system independent diagnostic software!

- O/S INDEPENDENT— Does not rely on O/S for diagnostics. All tests are full function regardless of O/S (Novell, UNIX, OS/2, etc.).
- LOW LEVEL FORMAT— Performs Low-Level format on all drive types including all IDE drives.
- TRUE HARDWARE DIAGNOSTICS— Accurate testing of CPU, IRQ's, DMA's, memory, hard drives, floppy drives, video cards, etc.



Call Now for Special Savings • 1(800) 864-8008 • Fax (818) 547-0397
1100 East Broadway, Suite 301, Glendale, California 91205, USA

CIRCLE 784 ON READER SERVICE CARD

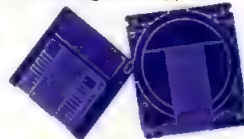
TransferPro™ for MS Windows

The Ultimate in Macintosh® File Transfers

- Read, Write and Format Macintosh media directly from your PC, also available for SUN, SGI or HP
- User Friendly, fast and easy to use
- Makes it easy to format both Mac and DOS cartridges & floppies

Supports Many Media:

- Bernoulli® & SyQuest® cartridge drives
- Magneto Optical Drives
- Data Shuttle drives
- SCSI hard disk drives & diskette drive
- Floppy diskette



800-467-1459 • fax 505/662-0897

tel. 505/662-1459

Digital InstrumentationTech., Inc.

Asian Distributor (Hong Kong)

Wilson Tech. Co.

fax 852-314-8114

tel. 852-314-8080

CIRCLE 792 ON READER SERVICE CARD

87%

OF PC MAGAZINE SUBSCRIBERS WHO KNOW
MARKETPLACE HAVE PURCHASED SOFTWARE IN
THE PAST 12 MONTHS, OR WOULD CONSIDER
DOING SO, AFTER SEEING AN AD IN THE SECTION.

INCLUDE IT FOR THE YEAR! ALL THAT'S
CALL FOR IT TODAY!

ARE YOUR HARDWARE LOCKS GIVING YOU TROUBLE

Numerous software programs on the market use electronic physical lock devices, presumably to prevent unauthorized execution. However if you experience a problem with your lock, you may incur costly hours of lost production time.

CAN YOUR BUSINESS AFFORD TO TAKE THE RISK!

SafeSoft Systems Inc. specializes in producing quality software and hardware products to eliminate the need for lock devices. Our products are designed as insurance to protect your software investment against costly downtime in the event your lock device is stolen, lost, damaged or fails. Lock devices are made from static sensitive CMOS circuitry that is subject to physical and human mishap.

P-CARD

will emulate the Sentinel Pro

C-CARD

will emulate the Sentinel C, Scribe

*Rainbow Technologies is not affiliated with SafeSoft Systems Inc. SentinelPro, SentinelC and Sentinel Scribe are registered trademarks of Rainbow Technologies. All products are intended for licenced users.

DON'T TAKE UNNECESSARY RISKS!

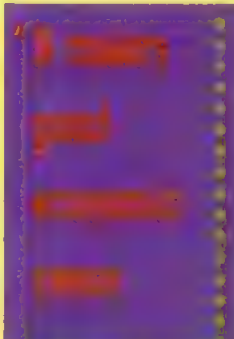
TRY OUR INTELLIGENT PRINTER PORT

These intelligent printer ports will not only add or replace a regular printer port, but comes with intelligence to emulate most of the current *Rainbow Technologies lock devices.

SAFESOFT SYSTEMS
201-1111 MUNROE AVE.
WINNIPEG, MANITOBA
CANADA R2K3Z5
Ph. (204)669-4639 or
Fax (204)668-3566

CIRCLE 793 ON READER SERVICE CARD

"Logical Connection markets are two different kinds of products: printer sharing hardware and memory chips. They're different audiences, but the buyers look in the same place for what they need: PC Magazine Premier."



...and the products in other publications. I've found that the people who buy Logical Connection products are the same people who buy PC Magazine Premier. They're looking for the same thing: a place to find what they need.



"It makes good economic sense to use PC Magazine Premier. We reach so many savvy, technical business people... who are looking to buy!"

—Rick Stanczak, President
Logical Connection



PC Magazine Marketplace
Nothing comes close!

1-800-825-4237

Explore the Internet - FREE!

DELPHI, a leading international online service, now offers full access to the Internet. You can explore this incredible electronic network with no risk. You get 5 hours of evening/weekend access to try it out for free!



Use electronic mail to exchange messages with over 10 million people throughout the world. Download programs and files using "FTP," connect in real-time to other networks using "Telnet," and participate in "Usenet Newsgroups" the world's largest bulletin board with over 3500 topics. If you're not familiar with these terms, don't worry; DELPHI has expert online assistants and a large collection of help files, books, and other resources to help you get started.

After the free trial you can choose from two low-cost membership plans. With rates as low as \$1 per hour, no other online service offers so much for so little.

5-Hour Free Trial!

Dial by modem, 1-800-365-4636*
Press Return once or twice
At Username, enter JOINDELPHI
At Password, enter PCM44A

DELPHI

Questions? Call 1-800-695-4005 (voice)
Send e-mail to INFO@delphi.com

*Current Internet users can Telnet to delphi.com instead. Complete details provided during the toll free

CIRCLE 794 ON READER SERVICE CARD

DE LORME

MAPEXPERT™

Version 2.0 — Completely Revised and Updated!

Your Route to Increased Productivity

MapExpert — a professional desktop mapping program — gives you a street-level map database of the entire United States, and the tools to customize and print high quality maps for any business need. One CD-ROM lets you:

- Locate areas by zip code, phone number, or place name
- Zero in on individual streets anywhere in the country
- Identify address ranges in major metropolitan areas
- Customize maps with graphic and text overlays
- Find latitude and longitude for any location
- Print high-quality maps in color or B&W
- Print mural maps...and more!

MapExpert's uses for increasing your business productivity are endless. Define delivery routes, outline sales territories, map out expansion strategies, plan property development, make nationwide travel plans, and more!

Now Only \$295 Direct

Suggested Retail Price \$495

Order Today

800-452-5931 ext. 8153

30-Day Money-Back Guarantee



PC "...MapExpert is an amazing bargain."

DeLorme Mapping Company, Lower Main St., Freeport, ME 04032

CIRCLE 795 ON READER SERVICE CARD

INTERNET FREE

The world's premier internet system is now online, offering you access to computers around the world!

ALWAYS FREE



1-515-945-7000

ROM BIOS UPGRADES

• Support Windows 3.0/3.1 • Support 1.2 MB & 144MB Floppy Drives • User defined hard drive types • Support VGA • Novell & Netware compatible • Enhanced 101 102 keyboard • 100% IBM compatible • Complete documentation • DOS 6.0 • Latest Version • Complete set up in ROM • Free Intel Chip Puller

We are the oldest and largest BIOS upgrader in the world. Guaranteed lowest prices all the time.

• IBM • AST • Wyse
• Acer • AMI • Kaypro
• Leading Edge • Micronics • Compaq
• DTK • Hyundai • Everex
• Dell • Sanyo • Gateway
• Sperry • Samsung • Tandy
• Hantarex • Wala American • Epson

"SPECIAL OFFER"
Get a FREE copy of PCSAFE™ utilities package with every order. Retail value \$149.95

ORDER TODAY
1-800-800-BIOS
MA, FL, CA OFFICES (2467)

UNICORE SOFTWARE
1638 Turnpike St. • North Andover, MA 01845
(508) 686-6468 • FAX (508) 683-1830

CIRCLE 796 ON READER SERVICE CARD

WINDOWS

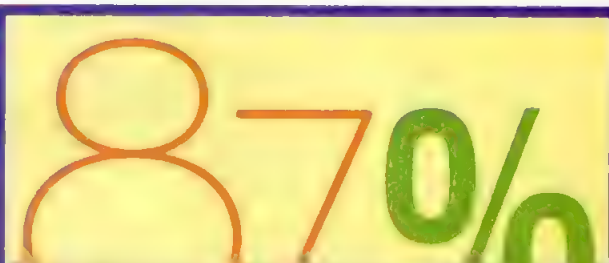
FREE ISSUE!

Inside Microsoft Windows is guaranteed to help you get the most out of Windows. But don't take our word for it. See for yourself.

Subscribe today and you'll get 13 issues for the price of 12 for only \$39! If you decide Inside Microsoft Windows is not for you, mark "cancel" on your invoice and return it. Your free bonus issue will be yours to keep with no further obligation.

Call for your FREE ISSUE today!

1-800-223-8720
Please mention code V3NW



OF PC MAGAZINE SUBSCRIBERS WHO KNOW MARKETPLACE HAVE PURCHASED HARDWARE IN THE PAST 12 MONTHS OR WOULD CONSIDER DOING SO AFTER SEEING AN AD IN THE SECTION. SHOULDN'T YOU SEE YOUR AD HERE? CALL 800-825-4237 TODAY!

INFORMATION RESOURCES-WINDOWS

PCMedia direct to you
Type I, II, III

- FAX MODEM (2400, 9600, 14,400)
- FLASH CARD (10mb, 20mb, 40mb)
- HARD DRIVE (40mb, 80mb, 100mb)
- ETHERNET (10Base5 Coax, Combo)
- AND MORE...

PCMedia
46560 Fremont Blvd., Suite 109
Fremont, CA. 94538 U. S. A.
Tech Support (510)490-8478, FAX (510)490-8613
Please call for latest price!
800 633 4272
800 MEDIA PC

CIRCLE 551 ON READER SERVICE CARD

HIGH TECH DIRECT

Best Data
14.4 int Fax/Modem
\$99.00
Full kit includes cables and software

CD ROM Players
All Brands Available
Starting at \$110!!!

Full line PC accessories
Sound Kits Call for Prices

Toll Free Order Line
800-777-7058
Visa/MC/COD

284 Harbor Blvd. Belmont, CA 94002
CIRCLE 552 ON READER SERVICE CARD

Ami Ham LOW WAREHOUSE PRICES!

TYPE	PKS.	100ms	80ms	60ms
256K x 4	DIP	\$5.41	\$5.49	\$5.59
1M x 1	DIP	\$8.87	\$8.56	\$8.75
256K x 9	SIMM	\$9.99	\$11.99	\$13.99
		60ms	70ms	60ms
1M x 9 3 chip	SIMM	\$42.00	\$41.00	\$43.00
1M x 9 9 chip	SIMM	\$45.00	\$48.00	\$49.00
4M x 9 9 chip	SIMM	\$155.00	\$159.00	\$169.00
1M x 36 72pin	SIMM	\$169.00		
4M x 36 72pin	SIMM	\$679.00		

MATH CO-PROCESSORS/CPUs

00P486-DX2	50MHz	INTEL	\$299.00
486DX-C-33	16-33MHz	CYRIX	\$69.00
486DX-C-40	40MHz	CYRIX	\$119.00
85X587	16-25MHz	CYRIX	\$56.47
85X587	33MHz	CYRIX	\$67.39
83DX87	16-33MHz	CYRIX	\$63.52
83DX87-40	40MHz	CYRIX	\$73.00

CALL FOR SIPPS AND CACHE MEMORY!
408-975-2440
FAX 408-975-2446
2809 Commerce Ave., #320 San Jose, CA 95128
All computers 100% guaranteed. We accept VISA, MC, Discover, (VISA and Discover PPV's with prior approval). Price, delivery and return features subject to change. Minimum order \$100. Returns require RMA, non-defective merchandise within 15% restocking fee.

CD-ROM Mini Tower

These CD-ROM towers are configured with high performance, double speed Texel CD-ROM drives. Texel drives are recognized globally for their superior data transfer rate and access speed. They resist their environment contamination; feature dust proof construction; are CD-XA ready; Kodak Photo CD Multisession compatible and are SCSI-2 compliant.

Boffin Towers come with...

- Internal SCSI cabling
- Mounting rails
- CD caddies
- External SCSI cable
- One year limited warranty



Network Ready 4 Bay Towers starting as low as **\$1876.00**

Featuring COREL Network Manager with CD-ROM Network Loadable Module (NLM)



4, 5, 6 and 7 Bay Models available
Can also be configured with
Toshiba CD-Rom Drive at additional cost

BOFFIN LIMITED

612-894-0595
FAX: 612-894-6175

2500 W. COUNTY RD. 42 • #5 • BURNSVILLE, MN 55337

CIRCLE 553 ON READER SERVICE CARD

The ultimate machine travels at the speed of **light**.
Our **CREST** machine is only a nonosecond away.



Virtual reality, advanced voice recognition, speech synthesis, full spectrum sound wave manipulation and movie video editing are just a few of the choices available.

FIELD TECHNOLOGY, INC.

WAVE CREST

From the people who design systems for the experts.

Voice: (203) 761-9363
FAX: (203) 761-9358
BBS: (203) 761-9368

CIRCLE 556 ON READER SERVICE CARD

DOLPHIN MICROCOMPUTER CORPORATION
1234 SOUTH ST. LONG BEACH, CA 90801
TEL: 310-422-4444
FAX: 310-422-7670

XT 12MHz 1MB RAM 40MB MONO SYS	\$455
286 25MHz 1MB RAM 40MB VGA MONO SYS	588
386SX 33MHz 4MB RAM 130MB SVGA SYS	999
386 40MHz 4MB RAM 130MB SVGA SYS	1099
486SX 25MHz 4MB VESA 130MB SVGA SYS	1233
486 33MHz 4MB RAM 170MB SVGA SYS	1456
486 50MHz 4MB RAM 200MB SVGA SYS	1666
486DX2 66MHz 4MB VESA 200MB SVGA SYS	1834
TWINHEAD NOTEBOOKS ALL MODELS	Call
ACER COMPUTERS ALL MODELS	Call
MOTHERBOARDS 386SX 386DX 486	Call
W. DIGITAL WD2200 212MB IDE HD	281
W. DIGITAL WD2250 235MB IDE HD	303
W. DIGITAL WD2340 340MB IDE HD	439
CHINON 1.2MB FLOPPY DRIVE 5.25"	48
CHINON 1.44MB FLOPPY DRIVE 3.5"	45
RIJITSU 101 CLICK KEYBOARD	41
NANAO 9080, F550, T560, 9400, T660, F750	Call

CIRCLE 558 ON READER SERVICE CARD

FTI High Quality & Low Price For Your System & Upgrade Needs FTI

Motherboards For Upgrade:

Pentium 60 PCI EISA w/256K	\$1590
Pentium 60 PCI ISA w/256K	\$1499
Pentium 60 VESA w/256K	\$1425
486DX2/66 EISA/VESA w/256K	\$695
486DX2/66 VESA w/256K	\$625
486DX/33 VESA w/256K	\$410
486SLC2/66 VESA w/64K	\$345
486DX/40 w/128K	\$170
386DX/40 w/128K	\$135
386SX/40	\$67

Case/Power Supply:

Mini Tower/200W	\$43
(2-5.25" & 3-3.5")	
Mid Tower/230W	\$70
(2-5.25" & 4-3.5")	
Full Tower/230W	\$85
(7-8.25")	
Delux Full/250W	\$120
(2 Fans, 8-5.25")	
Desk Top/200W	\$65
(2-5.25" & 2-3.5")	

Memory Module ... Call

14" SVGA (28)	\$260
14" NI SVGA (28)	\$280
15" NI Flat Screen	\$380
17" NI (26)	\$750
101 Kbd	\$26

Bare Bone Systems:

Pentium 60 PCI EISA	\$2430
Pentium 60 PCI ISA	\$2339
Pentium 60 VESA/ISA	\$2269
• Motherboard w/256K Cache	
• 100MB Memory • Delux Full Tower 2 Fans	
486DX2/66 EISA	\$945
486DX2/66 VESA	\$975
486DX/33 VESA	\$660
• Motherboard w/256K	
• 4MB Memory	
• Mid Tower/230W	
486DX/40	\$393
386DX/40	\$366
386SX/40	\$290
• Motherboard	
• 4MB Memory	
• Mini Tower/200W	

Flash Technology Inc.
55 W. Hoover Ave.
Mesa, AZ 85210
Order: 800-448-2031
Tel: (602) 464-9272
Fax: (602) 464-9856

CIRCLE 554 ON READER SERVICE CARD

399 275-9924
516 737-0800

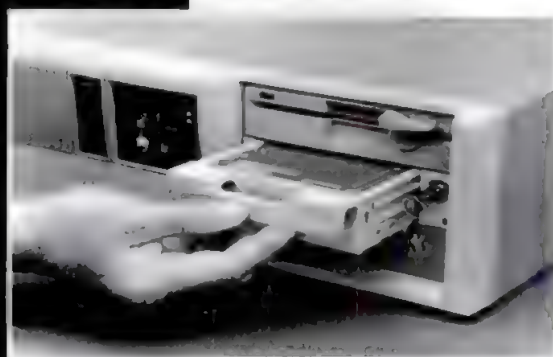
ALL MAJOR BRANDS

IBM Thinkpad 350C/125/250	\$2599/2999
IBM Thinkpad 750C	CALL
HP Laserjet IV/IVM	\$1349/1899
HP Laserjet 4P/4MP	\$999/1399
HP Scanjet IIP/ICX	\$799/995
HP 1200C/1200CPS	\$1399/1899
Contour 486/25 120/200	\$1975/CALL
486/25C HD 120/200	\$2299/CALL
LTE 486/25C 120/200	\$3999/4499
PROLINEAS	
425E 4/0 4/120 4/240	CALL \$1059/\$1199
433e 4/0 4/120 4/240	CALL \$1149/\$1299
430DX 4/0 4/120	CALL/\$1449
450DX 4/0 4/120 4/240	CALL/CALL
486DX/40 4/120	CALL \$1775
486DX 4/240 4/340	\$1899/1999
DESKTOP/PROLINEAS	CALL
NEWLET PACKARD TOSHIBA COMPAG	
Lotus SYMANTEC	
2.4	\$309 N. Antivirus
3.4A	\$369 N. Utilities
4.01 Win.	\$299 N. Desktop Win.
	\$115
Borland	
Base IV 1.5	\$469 C++/App
Base IV 2.0	\$479 Paradox 4.0
C++	\$525 Paradox 4.5
	\$530

Prices subject to change without notice. Prices subject to change without notice. Prices subject to change without notice. Prices subject to change without notice.

CIRCLE 557 ON READER SERVICE CARD

CRU DataPort™



Simply the best!

U.S. Patents 4,941,841 and 3,08,052

Removable Storage Module

Accepts standard 3.5" hard disk drives

- Versions for MFM/RLL, SCSI, and IDE
- Use in a variety of CRU and other enclosures
- "Ruggedized" for high reliability
- FCC verification

SECURITY/PORTABILITY/BACKUP

Remove your hard disk to prevent theft or unauthorized use. Transport your disk easily from one host computer to another. Store "ready-to-run" backup in a secure location.

Features the same rugged and reliable removable data storage unit used in the new CRU DataRAID™ fault-tolerant disk array system.

CRU Distributors: Tech Data, Gates/FA, C.B.C., D.S.S., Comstar, Arrow Electronics, Mini Micro.



CONNECTOR RESOURCES UNLIMITED, Inc.
Tel: 408-957-5757 • Fax: 408-942-0862

CIRCLE 558 ON READER SERVICE CARD

PENTIUM - 60 MHz

Since 1985, MSE has been dedicated to bringing you high-quality American designed, engineered and built computer systems for a wide range of applications. Now, for our 9th anniversary special, we are proud to introduce our fastest and most powerful machine. The Pentium - 60/66 MHz.

Low Cost Intel 486SX-25 MHz VLB \$695

- Mini-Tower Case, 32 Bit CPU
- Upgradeable to DX2-66MHz
- 4 MB RAM, expands to 32 MB
- 170 MB Fast Drive (15ms)
- 1 44 MB Floppy Drive
- 2 Serial/Parallel
- Enhanced Keyboard
- 128k Write Back Cache
- 33MHz add \$50

MSE VL 486DX-33 MHz

- 80486DX-33 CPU, 4MB RAM
- 1.44MB Floppy Drive
- 210MB Fast Drive (12ms)
- 128k Cache
- Enhanced Keyboard
- 50MHz DX2 add \$100
- 66MHz DX2 add \$200



PCI 486 DX2-66 MHz

- 8 MB Ram, 128 K Cache
- 340 MB 12 ms Hard Disk
- PCI SCSI II w/16550 Port
- PCI S3 SVGA 1 MB
- 14" SVGA 28 Monitor
- 101 Key Keyboard

\$1895

Motherboard Special

- 486SX-25MHz w/4MB RAM \$348
- 386-33MHz w/128k Cache/4MB RAM \$299
- 486-33MHz w/128k Cache/4MB RAM \$599
- 486-50MHz DX2 w/128k Cache/4MB RAM \$999
- 486-60MHz DX2 w/128k Cache/4MB RAM \$799
- 486 PCI-66MHz w/128k Cache/4MB RAM \$999
- 486 EISA-66MHz w/128k Cache/4MB RAM \$999
- Pentium-60MHz w/256k Cache/4MB RAM \$1499

Hard Disk SCSI-II

- Micropolis 3.0GB MC-1936 \$2299
- Micropolis 2.0GB MC-1924 \$1899
- Micropolis 1.7GB MC-2217 \$1099
- Micropolis 1.0GB MC-4110 \$849
- Quantum 525MB \$549
- Maxtor 340MB \$349

VESA Local Bus

- Micronics 486 DX-33 MHz VLB w/4MB \$799
- Micronics 486DX2-66MHz VLB w/4MB \$999
- Orchid S3 VLB 1MB \$149
- ET-4000 W32 VLB 1MB \$129
- Weitek P9000 VLB 2MB VRAM \$399

Power PC I Pentium P5-60 MHz

- Mini-Tower Case, 64 Bit CPU
- 4MB RAM, 256k Cache
- 1 0 GB SCSI II Hard Drive
- 1 44MB Floppy Drive
- Enhanced 101 Keyboard
- Intel PCI Chip Set

\$2395

CD & Multimedia SCSI/NT Compatible

- NEC CDR-84 JD-1 \$349
- NEC SCSI Host Adapter \$89
- NEC CDR-74-1 \$599
- Adapter VL-SCSI II \$299
- Pro Audio Spectrum 16 \$149
- Toshiba CD-3401 (200ms) \$349

PCI Local Bus

- PCI 486DX-33MHz w/4MB \$799
- PCI 486DX2-66MHz w/4MB \$999
- PCI ET-4000 w32 w/2MB \$199
- PCI motherboard includes: PCI IDE/SCSI/16550 UART on board

MS ENGINEERING, INC.

10801 S. De Anza Blvd., Suite 214, Cupertino, CA 95014
(408) 257-4240 FAX: (408) 257-4300

486, 386 and SX are trademarks of Intel Corp.

CIRCLE 560 ON READER SERVICE CARD

80MHz

The fastest 486 available

Full 3 year warranty.

486 DX/80 MHz Vesa Local Bus.....\$2,995

256K Cache, 16MB RAM, 340MB IDE, Dual Floppies, 2 S, 1P, 1G. VGA Windows Accelerator 1MB on VL-Bus, SVGA 15" color monitor 1024x768 .28mm non-interlace, 101-key Keyboard, MS-DOS 6.0, Windows 3.1. +Mouse.



Custom Systems built right for your needs... right now!

All systems FCC class B approved

199 Lafayette Drive
Syosset, NY 11791
(516) 921-0900

Call: (800) 883-0900
Fax: (516) 921-0977

CIRCLE 560 ON READER SERVICE CARD

Wanted: Used PCs!

We'll pay you cash for the following brands of used PC equipment:

IBM • Compaq • Apple
AST • Hewlett Packard
Any brand of Notebook/Laptop

Call for a free quote.

We don't buy brands other than those listed above!

We also sell refurbished PCs at discount w/1-year warranty. Call for current pricing!

Call 800-545-2313

RENTEX
Quality & Service Since 1980

CIRCLE 561 ON READER SERVICE CARD

486

Upgrade slow 386 with
486 50 or 66 Mhz

motherboards* from \$198.

*Made by IBM-3 year warranty.

486 Systems from \$698.

1 Year Parts, Lifetime labor warranty

MONEY BACK GUARANTEE

For immediate information any time

call (718) 335-9725 from your fax and

request document number 8101

Fulmark 73 Spring St., #407, NYC 10012

1 (800) FULMARK or

(212) 274-1194, fax 274-0803

\$198

CIRCLE 562 ON READER SERVICE CARD

Bar Code Headquarters

Offices in
USA and
Europe

Labeling Software

For Dot Matrix or LaserJet

Windows
Version!



- Any Format, Any Size Label
- WYSIWYG or Text Design
- Easy, Powerful
- Formats for Sears, K-Mart, Penney's, WalMart, TCIF, Logmars, AIAG, etc.
- Bar Codes: UCC-128, UPC/EAN, 2of5, MSI, 11, Codabar, Code 128, and Code 39
- Big Text and PCX Graphics tool!
- Powerful, Versatile, Easy to Use
- Imports ASCII data files from dBase, etc.
- LabelRIGHT™ for Windows — \$379
- Above Label Printed by LabelRIGHT™ — \$279

Cordless Radio Frequency Bar Code Reader



- For IBM or Macintosh
- Keyboard or Serial Attach
- No Software Needed
- Wireless range up to 100'
- Optional Pocket Beeper
- No License Needed
- FCC Approved
- Optional Pocket Beeper — \$295
- Base Station, Cable, and Wand — \$695

Portable Bar Code Readers

for PC, XT, AT, PS/2, Macintosh,
and Serial Interface Computers

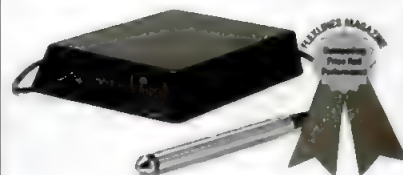
WITH
VOICE!

- Battery Operated Reader — 64K or 256K
- Kybd or Serial upload
- User's voice messages tell operator what to do at specified errors and at data entry steps. Messages are pre-recorded by microphone and broadcast thru built-in speaker or earphone. EASY! Any language.
- Wand, CCD or Laser Input
- UPC/EAN, 128, 2of5, MSI, Code 39, etc.
- Real Time Clock for date/time stamps
- Double duty as Non-portable Reader
- Very Easy to Program! Custom Prompts.
- 64K Unit with Wand & Voice — \$799
- 256K Unit with Wand and Voice — \$899



Bar Code Readers

for PC, XT, AT, PS/2, Mac
and RS-232 Terminals



- Attaches as 2nd Keyboard
- UPC/EAN, Code 128, 2of5, MSI, Code 39
- Wand, Magstripe, CCD, Slot Badge or Laser
- All European Keyboards Supported
- Superior Read Rates. Made in USA.
- Top Rated by Independent Reviews
- Complete with Laser Scanner — \$1250
- Complete with CCD Scanner — \$624
- Complete with Stainless Steel Wand — \$399

Ordering is Easy!

Call for
our Free
Catalog

- Made in the USA
- Free "800" Support
- Qualified P.O.'s Accepted
- 2 Year Warranty on Readers
- Same Day Shipping
- Free UPS Blue in US
- 30 Day Money Back Guarantee

European Office: (353) 1 6614 566
In US or Canada Call Toll Free

800-345-4220

Worthington Data Solutions
3004 Mission Street • Santa Cruz, CA 95060
FAX 408-434-0554 • Phone 408-434-0200

WORTHINGTON

DATA SOLUTIONS

ITS

Your One Stop Source for Bar Code Solutions

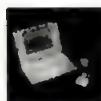
Quality • Performance • Value

ITS

Low Cost Software Reader

NEW!

- Eliminate external box with decoding software.
- No power supply needed for notebook/laptop.
- Windows, RS-232 and PC Wedge Version.
- Applications Include: Field Sales/Order entry and inventory, document tracking and shipping and receiving.



Select the Scanner You Need

- All types, configurations, sizes.
- Largest selection of Hewlett-Packard wands available.
- Lasers, CCD, slot, wand
- And POS/Retail Table-Top scanners.
- HP wands with built-in decoders.



Easy-to-Use Labeling Software

- For all dot matrix, laser, and bar code printers.
- Available for Windows and easy to use.
- Suppliers of Zebra and Sato bar code printers.



NEW!

Low Cost, High Performance, Compact Magnetic Stripe Readers

- Versatile: Tracks 1, 2, 3.
- Bi-directional and durable.
- Excellent for retail and industrial usage.
- RS232 and PC Wedge versions and encoders.



Value Packed Portable Terminals

NEW!

- Easy to upload data and to program.
- MS-DOS compatible terminal available.
- Multi-memory options, battery backup.
- Applications include: Inventory Control and Retail/point of sale.
- Programmable as a printer driver.



Bar Code Readers for IBM Compatibles, Mac, RS-232, Network Industrial Terminals, DEC, WYSE, IBM, HP, and other Hard-to-Find interfaces

- Plug and play. Easy Setup.
- No software needed.
- Multi-input versions available.

Call About Our 30 Day Money Back Guarantee! Variety of Payment Options! Toll Free Technical Support!
Next Day Delivery! Over 100,000 Satisfied Users! Technical Support!
Full 2 Year Warranty on Readers and Wands!

International Technologies & Systems

9201 Forest Hill Avenue, Suite 108, Richmond, VA 23235 • 855K No. Berry St., Brea, CA 92621
CALL US! Eastern USA (800) 826-1688 • Western USA (800) 228-9487
International Call (714) 990-1880 • FAX (714) 990-2503

CIRCLE 563 ON READER SERVICE CARD

Bar Coding for Windows

Code 39 Code 93 Int 2 of 5 PostNet
Code 128 Codabar MSI-Plessey UPC/EAN/ISBN



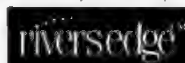
Postscript/TrueType Fonts
Easy-to-Use
30 Day Guarantee
\$149 each + S&H



Call for FREE Information

210.590.9528

Fax: 210.656.8993
10902 Forest Smt, San Antonio, TX 78233



CIRCLE 564 ON READER SERVICE CARD

BAR CODE READERS

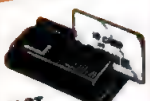
AMERICAN MICROSYSTEMS

2190 Regal Pkwy. • Euless, Texas 76040 • (817) 571-9015

FOR PC, XT, AT, PS/2 & TERMINALS:



MAG STRIPE



SLOT (BADGE)



WAND



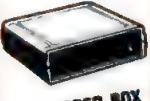
LASER



CCD



METRO LASER



DECODER BOX



PORTABLE READERS

- No software changes required
- Data appears as keyboard input
- Reads Code 39, I-2of5, UPC/EAN, Codabar, 11, 93, 128, MSI/Plessey
- Auto-discriminates between codes
- Accepts WAND, SLOT, MAG STRIPE, CCD, LASER
- Easy To Use

BAR CODE PRINTING SOFTWARE:

- For Epson, OKI, IBM, Dot Matrix and HP LaserJet Printers
- Prints Code 39, I-2of5, UPC/EAN, Codabar, 128, 93, 11, MSI/Plessey

PORTABLE READERS:

- Use as a portable, wedge or terminal
- Input Devices: WAND, CCD, or 5V LASER
- Real-time clock for date and time stamps
- Automatic power off with resume
- "Built-in" inventory programs
- 54 key alpha/numeric keyboard
- Supports HAYES compatible modems

(800) 648-4452 • FAX: (817) 688-8232
30 Day Money Back Guarantee
One Year Warranty

THE BARCODE LEADER DOES IT AGAIN...

KEYBOARD WEDGE SOLUTIONS!

HAND-HELD LASER GUN

FREE BARCODE PRINTING/CREATION SOFTWARE WITH LASER PURCHASE

\$895

STAINLESS STEEL WAND \$279

800 TECHNICAL SUPPORT
30 DAY MONEY BACK GUARANTEE
SAME DAY SHIPPING
2 YR LASER SCANNER WARRANTY

DATA/VISION
30 INDIAN DR. RYTLAND, PA 18974
TIMMY BURKHARTEN, 6253 HARVEY, WA 98335

1-800-486-0620
EAST COAST
1-800-486-9585
WEST COAST

CIRCLE 565 ON READER SERVICE CARD

Bar Code Expert

IBS

- Keyboard wedge readers for PC, XT, AT, PS/2, Mac, Terminals. No software change required
- Readers w/RS-232, RS-422, DTMF output and multibit protocol
- Reads UPC, EAN, Code 39, 11, 128, Interleaved 2 of 5, Codabar, MSI
- Wand, Slot, CCD, Laser, Magstripe
- Reader w/steel wand - from \$298
- Bar code labeling S/W - from \$99
- Direct from manufacturer
- 30 day money back guarantee
- Reseller's Discount available
- MICR check reader (use enhanced)
- Please call for free catalog

800-765-2271
IBS-Intelligent Barcode Systems
16031 Kaplan Ave., Industry, CA 91744
Tel: 818-968-6265 • Fax: 818-968-5527

BAR CODE

Software for Windows

(There is more than one way to print a bar code)

- Easy-to-Use
- True Graphics - Not a "Font"
- Paste into Any Windows app.
- Full DDE Support
- Rotation, Text, Color
- Fully Scalable. •WYSIWYG
- 90 Day Money-back Guarantee

Only \$199. Call for Info.
800 SCAN 004
Code 39, 128, 93, UPC, EAN, 2of5, Postal
Codabar, PDF417, etc., 17+ Symbolologies

TAL

T.A.L. Enterprises, 2022 Wallace St., Philadelphia
PA 19130 (215) 763-2620 Fax: (215) 763-9711

BAR CODE LABELING, PRINTING & READERS



New Version!
BEAR ROCK BAR CODE LABELER™
for Windows

- Design labels with bar codes, text & graphics.
- Choose from over 450 popular label formats, or design your own.
- Print all popular bar code symbologies.

Money Back Guarantee
Bundle Discounts
800 232-7625

PRINTBAR™ BAR CODE PRINTING



- PrintBar. Precision bar code fonts for Windows, OS/2 or Macintosh.
- PrintBar II. Bar code printing program for DOS.

CODESCAN 3000™ BAR CODE READER

- Compatible with PC, PS/2, Macintosh or serial terminals.
- Comes with wand and 5 year decoder warranty.
- Laser gun, CCD, badge slot, magstripe options.

Bear Rock TECHNOLOGIES
4140 Mother Love Dr., Ste. 100, Shingle Springs, CA 95682
916 672-0244 • Fax: 916 672-1103

AUTOMATE Your Business

...With Point of Sale



BASIS™ (Since 1987)
POINT-OF-SALE & INVENTORY CONTROL

- Affordable & Easy to use
- Amazingly powerful software
- Your solution to customer tracking, inventory control & reports
- Fully integrated with scanners, cash drawers, receipt printers, bar code printers & portable readers
- We provide the Hardware/Software solutions
- Nationwide Technical support provided

Valencia Computers
28309 Avenue Crocker, Valencia, CA 91355
(805) 294-6313
***M/C & Visa ***Easy Financing

CIRCLE 566 ON READER SERVICE CARD

MORE THAN BAR CODE SOLUTIONS

Acatech offers a wide range of bar code and PC products from the leading manufacturers, off-the-shelf, and custom software applications at competitive prices.

HARDWARE:

- Scanners, Wands, Decoders and Verifiers
- Portable and fixed data collection terminals
- Thermal transfer and direct printers
- PC's and related products
- Labels, Tickets, Tags, Badges

SOFTWARE:

- Label Generation
- Asset Management
- Inventory & Access Control
- EDI (Electronic Data Interchange)
- Labor Collection/Time & Attendance

Laser-pak
• Laser scanner
• Decoder
• Cables
\$1,095

Tell us what you want to achieve and we will make it happen. Please contact our Sales department for our complete catalog.

Acatech SOLUTIONS INC.
20381 Lake Forest Drive, Suite 814
Lake Forest, CA 92630
Phone: (714) 830-6800 Fax: (714) 830-6882

CIRCLE 567 ON READER SERVICE CARD

BEST VALUE BARCODE MORE FUNCTIONS MORE FLEXIBLE LOWEST PRICE



(800) CALL-ABT

Barcode Readers

- Keyboard wedge readers for PC, Mac
- Wand, Laser, CCD, or Magstripe
- UPC, code 39, 128, EAN/JAN 2of5...
- Complete w/steel wand \$295
- Complete w/laser \$995

Made
in the
USA

Portable Readers

- Double duty as Non Portable
- Portable w/steel wand \$595
- Portable w/laser \$1,295
- Bar code printing software from \$99
- 5 Year Warranty

Advanced Barcode Technology
(516)829-2135 Fax 829-0877

CIRCLE 568 ON READER SERVICE CARD

THE DATA ENTRY SOFTWARE SYSTEM FOR PC

KeyEntryIII®

Announcing Version 6.0!!

- Completely revised and redesigned documentation
- Totally new user interface
- New pull down menus, windows, and dialog boxes
- Powerful editing capabilities
- Enhanced data formatting capability
- Upgradable to ImageKey™ for image-assisted data entry

Call 800-533-6879 for
more information!

SCS Southern Computer Systems, Inc.
205-251-2985 FAX 205-322-4051
In UK: SCS Europe Ltd
0753-536550 FAX 0753-536765

Voice Mail Cash Machine



Make thousands of dollars effortlessly by installing our voicemail in your 286/386. Use it to answer your home office phone, rent pocket-pagers, advertise products or operate a pay-per-call service using credit cards, passwords or a 900#. Systems start at \$295.

Call 24 hours: **800.283.4759**
Int'l & Demo line: 818.718.9560

DemoSource™
The Voice Application Superstore
8345 Reseda Blvd, Ste 202
Northridge, CA 91324 USA

CIRCLE 573 ON READER SERVICE CARD

America's most popular, most complete, and most affordable solution for the mail order business—order entry/review, credit card processing with draft capture, UPS manifesting, profit analysis, accounting, telemarketing, list management, Clipper compiled, dBase III+ files. Single and Multi-user versions. Find out why more people buy MOM after comparing! Demo kit \$25 refundable deposit.

MailOrderManager™

Dyadcomp Development Corporation
150 River Road, Suite N1, Dept. PCM
Montville, NJ 07045

1-800-858-DMOM



CIRCLE 575 ON READER SERVICE CARD

PORTABLE™ PRODUCTS

YOUR COMPLETE SOURCE FOR BAR CODE AND HANDHELD DATA COLLECTION SYSTEMS

- **BARCODE READERS** — Keyboard wedge, RS-232, PC, Mac, Most data terminal interfaces
- **INPUT DEVICES** — Laser, CCD, Wand, Slot, Magstripe — All available with built-in decoder
- **PORTABLE HANDHELD READERS** — DOS & Windows Application Generators — No programming experience needed. Develop your Application in minutes.
- **Printers, Verifiers, Label Software, Labels, Custom Cases, Custom Software Development, Systems Integration, Complete Systems**

FREE UNLIMITED 800 TECH SUPPORT
UNCONDITIONAL SATISFACTION GUARANTEE
CALL FOR FREE CATALOG

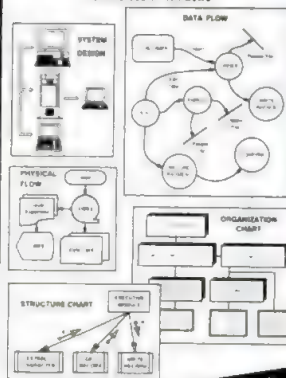
1-800-849-0958

**PORTABLE™
PRODUCTS**

A Division Of International Systems Group, Inc.
8401-K Mayland Drive • Richmond, VA 23294
phone: 804-346-0111 • fax: 804-346-0196

CIRCLE 569 ON READER SERVICE CARD

RFFlow™ Professional Flowcharting For Microsoft® Windows®



Create professional, fine quality charts quickly and easily. Call for free trial disk: (303) 663-5767 FAX (303) 669-4889

\$129.00 RFF ELECTRONICS
1053 Barton Court, Lakeland, CO 80538

CIRCLE 571 ON READER SERVICE CARD

COMPUTER PRODUCT GUIDE

Consumer Report By Phone

Hear The Latest
Best Buys & Top Rated
PC & MAC Products

CALL 900-659-0100

- Desktops • Laptops
- Integrated Software
- Graphics • Databases
- Communications Software
- Data/Fax Modems
- Monitors • Printers
- Financial Software and more.

900-659-0100

\$2.95 per minute
Touch-tone phone required
18 or over
Information Systems Support
Redwood Shores, CA

VIKING DATA ENTRY

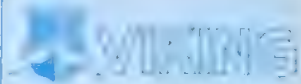
Professional Quality Software
makes your difficult
data entry jobs easier.

Viking Customer Care
insures you a quick easy
conversion to VDE.

For PCs, UNIX and VMS.

Call for free preview
800-324-0595

Ph: 918/491-6144 • Fx: 918/494-2701
In UK: 0937-588056 • Fx: 0937-588059



Viking Software Services, Inc.
1808 E. 67th Street, Suite 100
Tulsa, Oklahoma USA 74136-4959

SAVE
ON

9 TRACK REEL 3480/90 & DAT CARTRIDGE TAPE SYSTEMS



- Mainframe to PC to Mainframe Data Transfer
- High Capacity w/Compression Backup & Restore
- Complete Systems & Software for PC, SUN & MAC
- Service and Support, Easy Installation, Std & SCSI
- No. 1 in Customer Satisfaction
- Tape Duplication Systems
- New/Unused, Reconditioned, Used Tape Units
- Data Conversion & Duplication Services

call (910) 763-8400 or write to:
4304 Market St., Wilmington, NC 28403

WILTEC

CIRCLE 570 ON READER SERVICE CARD

AutoData PRO™ II

Desktop Forms Processing Software
for Windows 3.1

AutoData PRO II automates and simplifies the data collection process. Forms are read and the data is exported to your file format. A variety of desktop scanners are available.

PRE-PRINTED

HAND-PRINTED — reads name, address, date, phone numbers, etc.

BAR CODE

— reads product numbers, territory codes, form IDs, etc.

00097832

OCR — reads preprinted job codes, order numbers, form IDs, etc.

CHECK MARK

— reads multiple choice, rating, true/false, etc.

**AUTO
DATA**

A Windows 3.1
DLL is Available
for Developers

AutoData Systems

10365 W. 70th Street • Eden Prairie, MN 55444
Phone: 612/941-8180 • FAX: 612/941-7312

Toll Free: 800/662-2192

CIRCLE 572 ON READER SERVICE CARD

The Mail Order Wizard

Everything you need to manage
your growing phone-order or
mail-order business.

- Order processing
- Mail list management
- Electronic charge processing
- Inventory control
- UPS manifest
- Financial reporting
- Ad forecasting

**Winner of
Home Office Computing's
General Excellence Award**

Systems start at \$695
Call for free info or \$20 demo.

The Haven Corporation
1227 Dodge Ave., Suite M93
Evanston, IL 60202-1008
800-676-0098 or 708-869-3553

CIRCLE 574 ON READER SERVICE CARD

**NEARLY 9 OUT OF 10
PC MAGAZINE SUBSCRIBERS
HAVE PURCHASED DIRECT IN
THE PAST YEAR, AVERAGING
ONE DIRECT PURCHASE
EVERY MONTH.**

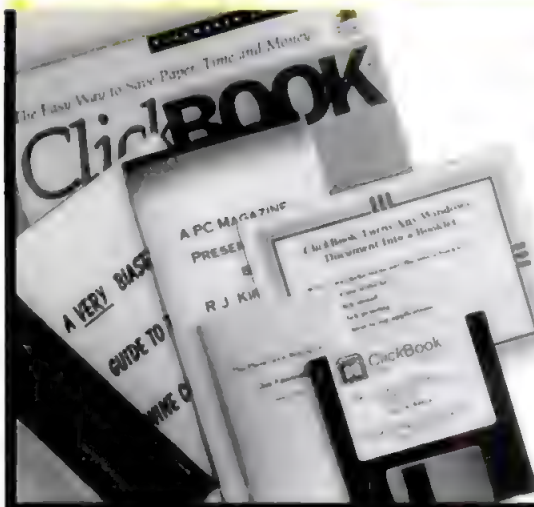
For more information on how
you can advertise
to these direct buyers,
call your PC Magazine
Marketplace account
representative today at:

1-800-825-4237



Source: PC Magazine Direct Market
Subscriber Study, 1992

To turn ANY Windows document into a handy booklet, just click, staple, and go!



Turn a 24 page report into a 6 page booklet. Transform pages of addresses into a pocket sized directory. Print manuals, programs, cookbooks, and more. **ClickBook™** makes it a snap!

Just click and **ClickBook** lets you select one of 18 styles, then it sets it all up, and even shows you how to print and staple.

ClickBook saves time, money, and paper. And it makes your Windows documents a pleasure to read.

The experts are raving about **ClickBook**.

"The most useful utility I've seen in months. It turns virtually any document created by a Windows application into a neat little booklet."

— Jim Seymour, PCWEEK, 8/9/93

"For saving paper and making virtually any kind of document easy to handle, **ClickBook** is a great utility that's stunningly easy to use."

— PC Magazine 11/23/93



Make your documents look like a million for just

Call 1-800-766-8531 to order **ClickBook** or (415) 617-1101 to find out more.

\$69.95

CIRCLE 577 ON READER SERVICE CARD

B.S. & M.S. In Computer Science

- ALL COURSES HOME STUDY
- Approved for tuition reimbursement by leading corporations
- Increase your earning power
- Join students from leading computer companies
- Ada and C++ courses available

FOR FREE
INFORMATION
CALL 1-800-
767-AICS or
1-205-323-6191

AMERICAN
INSTITUTE
COMPUTER
SCIENCES

The leading edge of learning

SERVICE BUREAU OUTPUT

35mm Color Slides
Color Overheads
Canon® Color Prints
Dye Sublimation Prints
4 x 5 Transparencies
Color Scanning
Video Output

NEXT DAY DELIVERY



703/343-8243 • Fax: 703/343-0691

800/433-8829

CIRCLE 578 ON READER SERVICE CARD

CD-ROM DRIVES

TOSHIBA, TEXEL & NEC

SCSI INTERFACE
TRANTOR
MEDIA VISION

CD-ROM TITLES, MAC & DOS
CD-ROM CADDIES & ACCESSORIES

COMPUTERS AT LARGE

Dedicated to CD-ROM Technology
Please Call for Our Price List

PH: (408) 255-1081 FAX: (408) 255-2388

800-642-4194

SARATOGA, CA

CIRCLE 581 ON READER SERVICE CARD

UP FRONT Multimedia, Inc.

Complete Kits
PLENTE TOSHIBA SONY
PRO AUDIO 16 & SPIRES
From \$289.95
w/ 6 Top CD Titles
2 Year Warranty
VISA-MC-AMEX

CD-ROMS
100's of Titles
Best Prices!

IBM
MAC

Drives & Software
(800) 923-7667 Toll Free
(818) 782-3683/FAX (818) 782-4411
Call for Free Catalog

SPECIALS

94 GROLIER'S MPC - \$50/MAC-\$60
Your choice of the following: \$29.95
The 7th Guest/Putt Putt Joins the Parade
Just Grandma & Me/Fatty Bear's Party
KIT SPECIAL - \$399.95
SONY 33A INT, DOUBLE-SPIN
with 16-Bit 5nd Card, Spikes, 6 titles

CIRCLE 582 ON READER SERVICE CARD

THE PC MAGAZINE
CLASSIFIED FORMAT
GIVES YOU MUCH MORE
FOR FAR LESS...

Flexible Ad Sizes
More Color Options
Lower Cost-per-Inch Rates

Call your
PC Magazine Marketplace
account representative today at:

1-800-825-4237

and let Classified
work for you.

Slide Imagers

Overnight
\$4.95
Slides &
Canons
Digital Output

- Slides/Overheads
- Dye-Sub Output
- Large Color Posters
- Canon Flery Lasers
- Slide Duplication
- 4x5 Neg/Pos/B&W



Scans \$1.90

(800) 232-5411

CIRCLE 579 ON READER SERVICE CARD

CD-ROMs Free Catalog Best Prices on CD's

7x4 GL 65" (20 60s)	\$35
CIGAS WINDOWS	\$18
CL PART HEAVEN	\$22
COOKBOOK HEAVEN	\$19
GGA GAMES	\$17
KODAK PHOTO CD	\$18
LEARNING HEAVEN	\$19
MARIO SMILING	\$24
MARIO GUNG	\$24
V KED UP MOTHER GOOSE	\$18
MONKEY ISLAND	\$22
PUB LIGH T V2.0	\$17
GR7-AVRADIO	\$19
REFERENCE LIBRARY	\$19
SHAREWARE HEAVEN 2	\$28
SIMTEL ARCHIVES	\$18
SOLAR HEAVEN	\$19
SOLAR NAV	\$22
WINDOWS HEAVEN	\$24

Write or Call:

MOST SIGNIFICANT BITS
15508 Madison Avenue
Lakewood, Ohio 44107
(800) 755-4619

CIRCLE 583 ON READER SERVICE CARD

CD-Rom Warehouse Outlet

100'S OF TITLES IN STOCK
MANY FOR UNDER \$10 EACH

\$9 each

1001 Utilities
House of Games
Jokes & Pranks
Game Arena
Font Master
Learning Adventure
America's Premiere Shareware
American Business Phone Book

The Pier Shareware

Over 640 Megs of the Most up to Date
Shareware: Date Checked, Virus Free
With The Pier High Performance File
Access Software - BBS Ready

Desktop Publishers Dream Disk
3700 Clipart Pictures in PCX Format
550 True Type, 450 Unlocked Adobe and
400 Downloadable HP Fonts. Comes
Complete With An 184 Page Book

JD EXPRESS
For Your CD Rom

CALL OR FAX FOR OUR LISTINGS
SALES 800-409-0617
SERVICE 516-563-0617
FAX 516-563-0618



HOME IMPROVEMENTS

**SIMPLY THE BEST VALUE
IN HOME SOFTWARE!**

Home Improvements is the most complete home organizational software, with all the features shown here and more.

Available for both DOS and Windows 3.1.

LOOK FOR HOME IMPROVEMENTS
AT A SOFTWARE STORE NEAR YOU.



CALL (612) 427-9100 FOR THE NAME OF A RETAILER NEAR YOU.

SOFTWARE DEVELOPERS



Stop giving your software away!

Don't take chances.

Use Sentinel[®] from Rainbow Technologies, the world leader in software protection. Sentinel hardware keys are the most effective and reliable execution control devices for DOS, Windows, OS/2, Macintosh, LAN and UNIX/open systems developers. Sentinel keys give you complete control and flexibility over your software packages.

Stop piracy and control distribution

Increase software revenues

Quick and easy to install

Call for a low cost Evaluation Kit today. 800/843-0413

RAINBOW
TECHNOLOGIES

97414 SOUTHERN PINE BLVD., CHARLOTTE, NORTH CAROLINA 28273
704/523-9500 • fax 704/523-7651

CIRCLE 585 ON READER SERVICE CARD

Interested in
**PC
SECURITY..**

CALL

(813) - 744-5177

FAX

(813) - 744-5197

EliaShim

MIRCOCOMPUTER INC.
4005 WEDGEHURST DRIVE
TAMPA, FLORIDA 33610

CIRCLE 583 ON READER SERVICE CARD

Key-Lok[™] Security

- ☐ Fighting piracy since 1982.
- ☐ Algorithmic response
- ☐ Programmable memory
- ☐ Very economical
- ☐ Device transparent to PARALLEL/SERIAL port
- ☐ Multiple security layers
- ☐ Counters/Real-time clock
- ☐ Multiproduct licensing
- ☐ DOS/UNIX/VMS/etc

Access Control System

Diskette Drive Locks

Microcomputer Applications

3167 E. Otero Circle
Littleton, CO 80122
(303) 770-1917

CIRCLE 584 ON READER SERVICE CARD

The only product line combines
fortified software encryption with
the Hardlock[™] family of copy
protection devices for single user
and network implementation.

Made in the U.S.A.



CIRCLE 586 ON READER SERVICE CARD

A chain is as strong as its weakest link.

Picture your Hardlock[™] key as a bike lock, and the accompanying software routines used to implement the copy protection as the chain. You can own the best lock that money can buy, but that lock is useless if the chain is weak.

Introducing **HL-Crypt**, a major breakthrough in copy protection. HL-Crypt is not just a shell or simple conditional response checker. Using our proprietary Patcher Technology, HL-Crypt encrypts and binds the application to your Hardlock[™] device. HL-Crypt features many protection modules that secure the application against piracy, reverse engineering, and debugging, to name a few.

Picture HL-Crypt as an ironclad chain. The only ironclad chain in the industry today.

For more information, call
1-800-562-2543

HL-Crypt

The Fortified Protection Linker
for Hardlock

GLENCO
ENGINEERING INC.

SERVING THE SOFTWARE INDUSTRY SINCE 1979

270 Lexington Drive
Buffalo Grove, IL 60089-6930
Phone 708/808-0300
Fax 708/808-0313

Contact us for the name of the distributor in your country.

Dongles? Buttons? Plugs?

Get Serious.

When it comes to software protection, you need solutions - not gadgets. You need **HASP** - the Professional Software Protection System.



Easy to Implement
Interfaces are available for most languages and a variety of installation

options are supplied to meet your needs and schedule.

Technology That's Tough to Beat
ASIC technology, sophisticated software and random encryption algorithms are just a few reasons your products are safer protected by HASP.

Developed with Users in Mind
Transparency. Compatibility. Connectivity. HASP was developed to perform unnoticed. Whether installed on a PC, Mac or network, your end-users will never know it's there.

Get Serious - Try It For Yourself
Find out why HASP is the fastest growing form of software protection in the industry. Order your HASP evaluation package today.



1-800-223-4277

ALADDIN
SOFTWARE SECURITY INC.

The Professional's Choice

The Empire State Building
350 Fifth Avenue, Suite 7204
New York, NY 10118, USA

Tel: 212-564-5678

Fax: 212-564-3377

Offices & Distributors Worldwide

©1994 Aladdin Software Security Inc.



PROTECT YOUR SOFTWARE TODAY

EVERLOCK 3.0

Software Solution

- ✓ OPTION BOARD SAFE
- ✓ CPU LOCK
- ✓ REMOTE REGISTRATION
- ✓ CD ROM LOCK
- ✓ MSDOS 6.0 & WINDOWS COMPATIBLE

with over 14 new features you have asked for over the years. If Software based protection is what you need, don't settle for anything less than **EVERLOCK 3.0**.



Az-Tech Software, Inc.

LEADERS IN SOFTWARE SECURITY

201 East Franklin, Suite 11 Richmond, MO 64085

(816) 776-2700 FAX (816) 776-8398

EVERKEY LOCKS & BUTTONS

Hardware Solution

We have combined the Versatility of Az-Tech Software and the **ONE WIRE** Hardware Compatibility of Dallas Semiconductor in the new **BUTTON** package. With its **PRICE** advantage and added Flexibility, **EVERKEY BUTTONS** will lead us into a dongleless world.

As your partner in the fight against Software Pirates, Az-Tech is the only company that offers you these options in both a Software and a Hardware Solution:

***DATE & EXECUTION LIMITS* COMPRESSION
*ENCRYPTION *SERIALIZATION* REMOTE RESET**

These systems are easy to use and most importantly, they work! No other company can provide you the Compatibility, Flexibility, Ease of Use and Degree of Protection that you receive with all Az-Tech products.



**Call Today For A Free Demo Disk
(800) 227-0644**

CIRCLE 588 ON READER SERVICE CARD

REMOVE HARDWARE LOCKS

Maintain Productivity!

Software utility that allows for the removal of hardware locks

Easy-Simple-Guaranteed

These and others are available:

MaxRoute	\$250.00
Pads PCB	\$99.00
CadKey	\$99.00
MasterCam	\$250.00
Tango PCB II	\$99.00
MicroStation	\$99.00
PCAD	\$250.00

**Visa and Mastercard
Welcome**
Call or fax for more information

SAFE SOFT SYSTEMS INC.

201-1111 MUNROE AVE.

WINNIPEG, MB

CANADA R2K 3Z5

PH (204) 669-4639

FAX (204) 668-3566

CIRCLE 589 ON READER SERVICE CARD

ICA Software

DARE TO COMPARE

**Highest Quality
Lowest Price
SHAREWARE
Guaranteed!!!**

Free Catalog

800-331-3065

P.O. BOX 1011-354 Trumbull, CT 06611

CIRCLE 590 ON READER SERVICE CARD

DATA CONVERSION

If you want the most complete conversion services in the industry, just call...



(800) CONVERT

Capabilities include over 5000 formats

PIVAR

COMPUTING SERVICES, Inc.®

165 Arlington Heights Rd. #M
Buffalo Grove, IL 60089

(708) 459-6010

DATA CONVERSION

**DISKS • TAPES • CARTRIDGES
CONVERSION-DUPPLICATION-SCANNING**

MORE FORMATS THAN ANYONE!

Quick • Reliable • Quality

WORD PROCESSORS, MINIS
MICROS, SPREADSHEETS
DATABASES, MAIL LISTS

IBM, DEC, APPLE, WANG
HP, WordPerfect, MS-Word



8/4MM, XEROX, CP/M, UNIX ...

NATIONAL DATA CONVERSION

5 East 16th Street, New York, NY 10003

(212) 463-7511

AMERICA'S LEADERS IN DATA CONVERSION

CIRCLE 591 ON READER SERVICE CARD

CONVERSIONS

To OR From Virtually

**Any Tape OR
Disk Format**

including:

- 9-track • DAT
- 3480 • QIC
- 8mm • Diskette

Conversion Systems Sold
Lowest Prices on Tape/Cartridge

Call 8 a.m. to 5:30 p.m. Eastern Time

HORAN DATA SERVICES

1-800-766-8885

708 Walnut Street, Suite 700
Cincinnati, Ohio 45202-2012

CIRCLE 592 ON READER SERVICE CARD

Ontrack

DATA RECOVERY



- PROFESSIONAL SERVICE - AUTHORIZED by Conner, Iomega, Maxtor, Micropolis, Quantum, Rodime, Seagate, Western Digital, & others.
- EXPERTISE in DOS, Novell, OS/2, Macintosh, Unix, Xenix, Banyan Vines, Sun, DEC, & Wang. Service also available on tape & removable media.
- ON-SITE, weekend, & priority service backed by 24-hour worldwide support.
- FOR FAST, SUCCESSFUL RESULTS call Ontrack, we can recover your data!

MN: 1-800-872-2599 • CA: 1-800-752-7557

U.K: 44-81-974 5522 • Germany: 0130-815-198

6321 Bury Drive, Eden Prairie, MN 55346 • 2400 Main Street, Suite 200, Irvine, CA 92714

DUPLICATION EQUIPMENT

For-in-house duplication, MediaFORM is the source. We sell and service high-quality software duplication and labeling equipment. And we can tailor a complete, cost-effective system to meet your specific needs.



Copies Both 3.5 & 5.25
Disks. Like Two Machines
for the Price of One

MediaFORM
800-220-1215

215-458-9200 (in PA) Fax: 215-458-9554
Eaton, Pennsylvania 19341

PCMCIA Card Duplicator



- Duplicates PCMCIA 2.0 JEIDA 4.1 (Type I, II, III) cards in all technologies (FLASH, SRAM, OTP, EEPROM, Mixed)
- Ultrafast! Copies 32x1Mb Flash cards in 13 seconds
- Software is Windows based with optional Touch Screen Interface



H&K MICROSYSTEM INC.

Tel: (408) 730-5511 Fax: (408) 730-5521

CIRCLE 588 ON READER SERVICE CARD

DUPLICATION EQUIPMENT



- StandAlone & PC based units available
- Compact design
- Low maintenance
- Economically priced
- Expandable options to network system
- Fast - Up to 138 3- 1/2" 1.44MB per hour
- One year factory warranty

BULK DISKETTES DATA CARTRIDGES MEDIA SUPPLIES

CALL: CHAMPION DUPLICATORS INC.

800-752-1145 FAX 510-659-0247

CIRCLE 589 ON READER SERVICE CARD

CD-ROM MASTERING & DUPLICATION

ALL DISK FORMATS

9-Track Tapes

1/4" Cartridges

Quickest turnaround

Quality Media

Lowest prices

DUPLICATION

Virus scanning

Copy Protection

Fulfillment

Custom Printed Labels & Sleeves

For more 'Dupe Talk' call
COMPANIA, INC.
Ph: 312-419-8771
Fax: 312-419-1390
1-800-374-DISK

CIRCLE 590 ON READER SERVICE CARD

QUALITY CONVERSIONS

TAPE • DISK • SCANNING
CARTRIDGES • FICHE • FILM
WORD PROCESSORS, MICROS, MINIS,
MAIN FRAMES, TYPESETTERS
(customized programming available)

QIC	TAR	4MM	9-TRACK
8MM	VMS	3480	TK-50/70/85
IBM	APPLE	LANIER	MS/DOS
MAC	CPT	MICOM	Spreadsheets
WANG	NBI	UNIX	DATABASES
XEROX	EXXON	XENIX	MAILLISTS
DEC	VYDEC	CP/M	+2000 OTHERS

OPTICAL FILING SYSTEMS
QUICK TURNAROUND
BEST RATES
FREE TEST

1ST **LEAF** Computer Services Inc.
1261 Broadway Ste 508, New York, NY 10001

212-779-0800
800-833-2207

SOFTWARE DUPLICATION

Complete Software Manufacturing Solutions

- Duplication 100% Guaranteed
- Highest Quality Media & Equipment
- Ultra Competitive Pricing
- 24 Hour Turnaround
- Graphic Design & Manual Printing
- Packaging, Assembling & Shrinkwrapping
- Excellent Service



APC, Inc.

29620 Union City Blvd
Union City, CA 94587
Local 510-489-8677
Fax 510-489-8678

800-666-1007

CIRCLE 594 ON READER SERVICE CARD

SOFTWARE DUPLICATION

- Highest Quality Media
- Competitive Pricing
- 24 Hour Turnaround
- Total Quality Assurance
- Custom Labels & Packaging
- Sales and Service of:
DUPLICATION EQUIPMENT

PRINCETON DISKETTE

800 426-0247

1101 RICHMOND AVE. • PT. PLEASANT BCL, NJ 08742

CIRCLE 595 ON READER SERVICE CARD

WE WROTE THE BOOK ON DISK DUPLICATION.

Call Us For Your Free Copy !

- Diskette Duplication
- Packaging / Fulfillment
- Magnetic Media Testing
- Professional Mastering
- Statistical Process Controls
- Fast Turn Around
- Great Prices / Flexible Terms

MATRICES CORP.

1-800-747-0583

Rochester, New York

CIRCLE 597 ON READER SERVICE CARD

Diskette Duplicator



\$1,895

240 copies per hour using an IBM PC/AT or compatible. Autoloaders and labelers are also available.

800-823-4144

RIMAGE Datapath

**DUPLICATION
FROM \$.49****HIGHEST QUALITY MEDIA**

From \$.49 (5.25") and \$.80 (3.50")

- All Diskette Formats
- Custom Labels
- Diskette Mailers / Accessories
- Assembly Services
- Generous Volume Discounts

FORMATTED DISKETTES

FORMATTED	QTY 250	BLANK
5.25"	3.50" DS/HD	\$5.50
5.25"	3.50" DS/DD	\$4.99

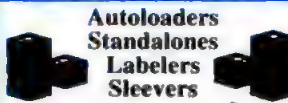
- **FREE FORMATTING** on First Order
- **BASF, MEMOREX, VERBATIM**
- **SONY AVAILABLE** for Small Upcharge
- **COLORED MEDIA** Please Add \$.05

800-255-3142Diversified Systems Group, Inc.
PO Box 1114, Issaquah WA 98027

CIRCLE 690 ON READER SERVICE CARD

**SOFTWARE
DUPLICATION**

Disks and Tapes
Printing Services
Package Assembly
Fulfillment
In-Bound Tele-Sales

Introducing
CD-Rom Duplication**DUPLICATION
EQUIPMENT**

Autoloaders
Standalones
Labelers
Sleevers

MEGAsoft**(800) 222-0490**

FAX: (908) 462-5658

819 Hwy. 33E • Freehold, NJ 07728

CIRCLE 602 ON READER SERVICE CARD

HARD CASE PROTECTION

Your notebook won't feel a thing!

**NB-4000**
\$179.95Hard case for
notebook, 15" x 11" x 1.5"
with handle, strap, and
lock.**NB-3000** \$149.95

Hard case for 3.5" floppy disk, 5.25" x 3.5" x 1.5"

NB-1000 Hard case for 5.25" floppy disk, 5.25" x 5.25" x 1.5"

- Hard case, 15" x 11" x 1.5"
- Highest quality, 100% interior
- Lockable • Made in USA

1-800-475-0707
719-531-5535

DOUBLECASE

5350 N. Academy Blvd.
Colorado Springs, CO 80918

CIRCLE 605 ON READER SERVICE CARD

**NEARLY 9 OUT OF 10
PC MAGAZINE
SUBSCRIBERS HAVE
PURCHASED DIRECT
IN THE PAST YEAR,
AVERAGING ONE
DIRECT PURCHASE
EVERY MONTH.**

For more
information on
how you can
advertise to
these direct
buyers,
call your PC
Magazine
Marketplace
account
representative
today at:

**1-800-
825-4237****CLASSIFIED**Source: PC Magazine Direct
Market Subscriber Study, 1992**MEDIA VALUE**
OUR NAME SAYS IT ALL!**Diskettes & Tapes**

PC Formatted	OEM Grade
3.5" DS/DD 34¢	3.5" DS/DD 30¢
3.5" DS/HD 44¢	3.5" DS/HD 40¢
5.25" DS/DD 20¢	5.25" DS/DD 21¢
5.25" DS/HD 28¢	5.25" DS/HD 27¢

Recycled OEM Grade

3.5" DS/DD 30¢	5.25" DS/DD 15¢
3.5" DS/HD 40¢	5.25" DS/HD 23¢

5.25" disks include sleeves
All disks priced in lots of 100.
Lower prices for larger quantities.

Data Cartridges

2120 QIC 80 Bulk	\$13.99
2120 QIC 80 Verbatim	\$17.25

(in lots of 5)

Monthly Special

CD Caddies \$4.99 each

800-845-3472

FAX (408) 727-3155

Diskette and CD Duplication available.

CIRCLE 600 ON READER SERVICE CARD

**media
source**
SINCE 1986**DISKETTES**

100% Guaranteed High Grade O.E.M.

PC Grade Duplexer Bulk

Blank Formatted	Blank Formatted
3.5" DS/DD 32¢ 36¢	3.5" DS/DD 40¢ 43¢
3.5" HD 44¢ 52¢	3.5" HD 59¢ 67¢
5.25" DS/DD 18¢ 23¢	5.25" DS/DD 22¢ 26¢
5.25" HD 24¢ 29¢	5.25" HD 28¢ 36¢

SONY/Verbatim Bulk

Blank Formatted	Blank Formatted
3.5" DS/DD 54¢ 57¢	5.25" DS/DD 22¢ 26¢
3.5" HD 90¢ 96¢	5.25" HD 30¢ 37¢

All 5.25" include Sleeves. Prices per lot of 100.
Lower on Higher Quantity

800-356-2553

FAX (404) 919-9228

CIRCLE 603 ON READER SERVICE CARD

**BULK
DISKS**

SONY ♦ DYSAN ♦ VERBATIM

QTY 250

BLANK FORMATTED

5 1/4" DS/DD .33	.39
5 1/4" DS/HD .37	.45
3 1/2" DS/DD .39	.47
3 1/2" DS/HD .49	.59

SPECS INCLUDE SLEEVES/24 HOUR SHIPPING

800-426-0247

We also sell and service
duplication equipment and
disk duplication services.

**PRINCETON
DISKETTE**

1101 Richmond Ave., Ft. Meade Bldg., NJ 08742

CIRCLE 606 ON READER SERVICE CARD

**DISK
FACTORY**

• Duplicate Any Format.
• 5 1/4" & 3 1/2" Diskettes
• Stand-Alone or PC Based.
• Fast & Versatile.

1-800-727-DISK (3475)

CIRCLE 601 ON READER SERVICE CARD

**FORMATTED
DISKETTES**

5 1/4" 360K ... 39¢	3 1/2" 720K ... 45¢
1.2mg ... 46¢	1.4mg ... 58¢

TAPES

2000 ... \$11.00	2120 ... \$15.50
6150 ... 15.50	6525 ... 22.50
4mm ... 11.25	8mm ... 10.25

**SONY • BASF
VERBATIM**

Price per disk in lots of 300
Subtract .04¢ for unformatted DD.
Subtract .09¢ for unformatted HD.
Tapes in lots of 10. Mix and Match.

MEGAsoft**(800) 222-0490**

FAX: (908) 462-5658

819 Hwy. 33E. Freehold, NJ 07728

CIRCLE 604 ON READER SERVICE CARD

**TONER
CARTRIDGES**
REMANUFACTURED

PRICES FROM

\$45

SHIP INCL.



TESTED - GUARANTEED - 24-HR TURN
HP, Apple, Canon, IBM, etc. Laser Cartridges
Canon/Sharp/ZXerox Drum Copier Cartridges

MICR Toner, Fonts, Software for Laser Check Printing
Color Toner for Canon and IBM copiers
OPC Cartridges and Toner for almost all laser printers

1-800-239-4027

1-800-722-2804 (Atlanta)

**ADVANTAGE
LASER PRODUCTS, INC.**

1929 Queen City Ave. Tuscaloosa, AL 35401

2030 Powers Ferry Rd STE 218 Atlanta, GA 30339

CIRCLE 607 ON READER SERVICE CARD

Fantasia**Services Unlimited BBS
!!! FREE !!!**

- FREE Access For Women
- FREE Trial Period
- ADULT Graphics
- LIVE Online Chat
- New Files Added Daily
- Unlimited Downloads
- All High Speed Lines
- MatchMaking Online
- Straight and Gay Sections
- Your Privacy Assured

Fantasia, where your fantasies are just
a phone call away...

24 hours a day, 7 days a week, 365 days a year
Fantasia, we never close...

714.579.7022

CIRCLE 608 ON READER SERVICE CARD

CD-ROM THE LATEST RELEASES AND JUICIEST CLASSICS!

LOWEST PRICES

LARGEST SELECTION

FREE DEMO CD WITH EVERY ORDER!

INTERACTIVES

- ◆ CD 100 DIRTY TALK (PC)
4 INDIVIDUAL EROTIC PERFORMANCES.....\$79.95
- ◆ CD 101 DOORS OF PASSION (PC)
EXPLORE THE DOORS OF PASSION MANISSON.....\$69.95
- ◆ CD 107 DUNGEON OF DOMINANCE (PC)
MEET MISTRESS JACQUELINE & FRIENDS.....\$79.95
- ◆ CD9911 ADULT MOVIE ALMANAC* (PC/MAC)
MEET MISTRESS JACQUELINE & FRIENDS.....\$59.95
- ◆ CD20121 THE DREAM MACHINE* (PC/MAC)
DREAM GIRL ADAPTS TO YOU FANTASY.....\$69.95
- ◆ CD2002 ADV. OF SEYMOUR BUTTS (PC/MAC)
FOLLOW SEYMOUR & HIS QUOTIENT CAMERA.....\$69.95
- ◆ CD7052 NIGHTWATCH (PC/MAC)
SEXY SECURITY NIGHTWATCHES THE ACADEMY.....\$69.95
- ◆ CD7053 NIGHTWATCH 2* (PC/MAC)
SEXY SECURITY MAKES HER ROUNDS AGAIN.....\$69.95
- ◆ CD4002 DIGITAL DANCING* (PC/MAC)
DANGER OF YOUR CHOICE TAKES IT ALL OFF.....\$69.95

PLEASE SPECIFY ☐ PC OR ☐ MAC
MUST BE 21 OR OLDER

ADULT MOVIE

- ◆ CD7001 HIDDEN OBSESSIONS (PC/MAC)
PENTHOUSE PET* JAMIE JOHNSON.....\$69.95
- ◆ CD9009 HOUSE OF DREAMS (PC/MAC)
FULL LENGTH RELEASED DEC. 1993.....\$59.95
- ◆ CD9012 SECRETS (PC/MAC)
ASHLYN DERE, SAMANTHA STRONG, JEANNA FINE.....\$59.95
- ◆ CD9022 NIGHT TRIPS (PC/MAC)
ANDREW BLAKE MASTERPIECE, TORI WELLES.....\$69.95

CLASSIC MOVIES

- ◆ CD8001 LEGENDS OF PORN II (PC/MAC)
FULL LENGTH CLASSIC.....\$69.95
- ◆ CD1002 NEW WAVE H.Y. KERS (PC/MAC)
CLASSIC SERIES STARRING GINGER LYNN.....\$49.95
- ◆ CD1003 NEW WAVE H.Y. KERS II (PC/MAC)
THE SECOND WAVE STARS SIZZLING SAVANNAH.....\$49.95
- ◆ CD1004 TRACI I LOVE YOU (PC/MAC)
EURO-LOCATIONS & LUSCIOUS TRACI LORDS.....\$49.95
- ◆ CD1005 INSATIABLE (PC/MAC)
EROTICA LEGEND MARILYN CHAMBERS.....\$49.95
- ◆ CD8001 CAFE FLESH (PC/MAC)
SERVED UP HOT & FULL LENGTH.....\$49.95

PHOTO DISCS

- ◆ CD102 EXTREME DELIGHTS (PC)
WOMEN & MEN GET EXTREME & SEXY.....\$69.95
- ◆ CD104 PUBLIC FANTASIES (PC)
A SEXY VARIETY WITH PRINT OPTIONS.....\$69.95
- ◆ CD800 J. STEPHENS HICKS #1 (PC/MAC)
100 PROFESSIONAL PHOTOS OF SEXY WOMEN.....\$39.95
- ◆ CD8003 AMERICAN GIRLS* (TOPLESS) (PC/MAC)
250 PHOTOS OF AMERICAN'S SEXIEST WOMEN.....\$39.95
- ◆ CD9002 ADULT PALATE VOL. 1 (PC/MAC)
100* HIGH-RES. ADULT MOVIE STILLS.....\$39.95
- ◆ CD9003 ADULT PALATE VOL. 2 (PC/MAC)
100* HIGH-RES. ADULT MOVIE STILLS.....\$39.95
- ◆ CD8002 HIGH VOLUME NUDES (PC/MAC)
HIGH-RES. HIGH VOLUME.....\$39.95

COMBO PACKS

- ◆ CD105 DIRTY TALK Plus
EXTREME DELIGHTS (PC/MAC)
DOUBLE DEAL And FREE CD STORAGE RACK.....\$99.95

PHONE ORDERS: 1-800-696-9292

VISA

AMX • CASH • CHECK • MONEY ORDER
NEXT DAY DELIVERY.....\$16.00
2ND DAY DELIVERY.....\$9.00
UPS DELIVERY.....\$4.00
FOREIGN ORDER *100 MINIMUM
AIR REGISTERED.....\$35.00
EXPRESS MAIL.....\$35.00
U.S. CURRENCY ONLY

MAIL TO:
TM PUBLISHING
2608 SHIGHLAND PARKWAY
LAS VEGAS, NV 89109

VIEW AND INTERACT with your favorite
stars: Ashlyn Gere, Jeanna Fine, Ginger
Lynn, Savannah, Traci Lords, Melissa
Mounts, Kimberly Kupps, Tori Welles, &
Marilyn Chambers.

FAX ORDER 1-702-796-5655

TM PUBLISHING INC. is dedicated to providing
the highest quality in Adult CD-ROM software.
We feature Interactica™ CD-Rom titles. We offer
the most diverse product line and many of our
products have been featured on "The Joan
Rivers Show", "The Phil Donahue Show", "Hard
Copy", "A Current Affair" and "CNN".

MAGICAL creations BBS

This BBS is so **HOT...**
if it causes **MONITOR MELTDOWN!!**

- ◆ ORIGINAL GIFS NOT AVAILABLE ON ANY OTHER BBS.
- ◆ SHEILA'S COMPUTER MATCHMAKER
- ◆ HOT TALK WITH OUR 1000s OF SUBSCRIBERS
- ◆ ACCESS TO SIX SWINGER CONTACT MAGAZINES!

New exclusive On-Line Shopping with our Magical Escapes®
shopping guide. Hard to find books and magazines, Videos and more!
Special 1 month access to basic services plus 4
hours of sizzling action on our all adult BBS!

Just \$45⁰⁰ VISA/MC/AMX TO ORDER BY PHONE: 702-796-9966
or mail to: TM Publishing Inc. PO Box 17070 Dept PCM594 Las Vegas, NV 89109

Must Be Over 21 To Order

TO LOG-ON: (702) 796-7300

CIRCLE 509 ON READER SERVICE CARD

CIRCLE 611 ON READER SERVICE CARD

Sexy Software™ Sexy Software™

SEXY DISKS™

SEXY CD-ROMS™

Sexcapades™... The GAME

The First Adult Game with TRUE SOUND and 256 Color VGA Graphics
The game everyone has been waiting for. For that evening you won't forget with a loved one or group of very
close friends. Fulfill your sexual desires. Find out how your partner would really like to make love. Over 80
Color VGA Scenes • Real Voices Guide the Action • Foreplay, Uppies • Play with 2-8 Grosse Friends. Now sup-
ports SoundBlaster™ cards! Reg. price \$79.95. VGA and hard disk required - shipped in high density disks.

SPECIAL SALE PRICE \$49

CONNOISSEUR COLLECTION ALL NEW! In 256 Color VGA!!

- ◆ ALL movies have sound - play thru standard speaker or SoundBlaster™
- ◆ **Sexy Disk #CC1 • YOU BE THE STAR •** THE FIRST CUSTOMIZABLE movie. You write the dialog and title
- ◆ **Sexy Disk #CC2 • THE FIRST SOUND MOVIE!** The first computer movie with SOUND. See the incredible
- ◆ 256 color VGA graphics while hearing the actual dialog. OURS EXCLUSIVELY!
- ◆ **Sexy Disk #CC3 • THE BEST MOVIE!** The best computer movie available. Only for the serious collector. 256 stunning VGA colors
- ◆ **Sexy Disk #CC4 • VOLUPTUOUS MOVIE with Sound!** See and hear a symphony of exceptionally proportioned women
- ◆ **Sexy Disk #CC5 • ODDITIES MOVIE with Sound!** See men of incredible proportions and women with
- ◆ unique abilities - UNBELIEVABLE!

Prices: 1 Movie \$29. 3 Movies \$65. 5 Movies \$94

Now You Can Have Your Own GIRLFRIEND™

... a sensuous woman living in your computer!
GIRLFRIEND is the first VIRTUAL WOMAN. You can watch her talk to her, ask her questions and relate with
her. Over 100 actual VGA photographs allow you to see your girlfriend as you ask her to wear different outfits,
and guide her into different sexual activities. As a true artificial intelligence program, GIRLFRIEND starts with a
3000 word vocabulary and actually GROWS the more you use it. She will remember your name, your birthday
on your lives and dislikes. GIRLFRIEND comes with the base software and GIRLFRIEND LIB. Additional girls
will be added. This program requires 7-10MB of free space.

803 GIRLFRIEND - Special Introductory Price \$89. FREE 1 Second GIRLFRIEND Just Added.
NEW! 507 GIRLFRIEND TGT - 300+ PICTURES Price \$79.

ORIGINAL Sexy DISKS - 6 disk set with movies, pictures, games \$32

ADD \$4 S/H • 3.5" Or FOREIGN ORDERS ADD \$2/DISK • IN PA ADD TAX • MUST STATE AGE OVER 21 YEARS
VISA/MC Orders Only: 800-243-1515 Ext. 600CM / 24 HRS / 7 DAYS
FAX (215) 997-2571 • Or C/M/O to: Sexy Software, P.O. Box 220, Dept. 600CM, Hatfield, PA 19440

CIRCLE 810 ON READER SERVICE CARD

SUPER CD-ROM SALE

ALL CD-ROMS \$69 EACH OR 3 FOR \$149

LIMITED OFFER - MAY BE WITHDRAWN AT ANY TIME REG. \$79 EACH OR 3 FOR \$179

Sexy FLIX - Full Length Digital
Movies - Ours Exclusively!

KING D. - The driest and loudest movie ever made. CRYSTAL HOLLAND stars with
prehistoric monsters, cannibals, and lots of space effects.
TOO NAUGHTY TO BAY NO - HARRY REEMS and GINGER LYNN star in an erotic
daydream in a boarding school for girls - from CABALLERO HOME VIDEO dir.
SUZE RANDALL.

SEX GAMES - When a hacker taps into a computer dating service he is able to pro-
gramme the wildest fantasies of his secret member - SHAUNA GRANT stars.
Sexcapades - The MOVIE - See incredible uses of a mouse and a joystick as a
group of friends play our popular Sexcapades game.

NO HARD DISK SPACE REQUIRED - WINDOWS NOT REQUIRED

Sexy CD-ROMS

Sexy CD #1 The premiere adult collection - 650 MB of action with over 2500 VGA
pictures, stories, cartoons, games, sound files. DARE TO COMPARE!

Sexy CD #2 an exclusive collection containing over 1000 Super VGA pictures
(1024 x 768 x 256) and over 300 MB of true 24 bit color. These are pictures
that cannot be found anywhere else! The women and the quality are stunning.

Sexy CD #3 another collection of over 650 MB of the hottest pictures
available. Over 3000 VGA pictures, movies and utilities that will have
you spending days just trying to see it all!

MENU DRIVEN VIEWING - NO DUPLICATION

MIX & MATCH CD-ROMS / Sexy PIX™

COLLEGE GIRLS, DOORS OF PASSION, PUNCH OF PEPPER, 30 DREAMGIRLS,
DREAM MACHINE, TRACI I LOVE YOU, SETMOON BUTTS, WICKED WHISPERS,
BODACIOUS BEAUTIES, WORTHLESS DELICIES 1 & 2, SIZZLE, WOMEN ON WHEELS,
DEEP THROAT, DERRIE DOES DALLAS, ASIAN LADIES, HOT PIX 2, 3, 4, 5, EXOTIC GEMS,
TROPICAL GIRLS, DIGITAL DREAMS, PRINCESS OF PERVA

Gourmet gallery

Continuing our tradition of offering
only 100% original GIF files,
Gourmet Gallery BBS is becoming
one of the nation's largest and
most popular sources of new,
exciting adult images. Our
commitment to offering at least 50
brand new GIF images every week
allows you, the user, access to a
virtually unlimited supply of GIFs
for your collection. We now also
offer thumbnail files of our GIFs, so
you only download the images you
want. We also offer seven of the
most popular adult & shareware
CD-ROMs online, 24 hours a day.
16 lines available at 1200-
14.4k. Over 7 gigabytes of files
online, and growing. Prices start as
low as \$2.75/meg, with no
charge for unlimited connect time.
Tired of GIF deja vu? Call us.

adults only, please

408.956.5656

San Francisco's Premier Adult Gay Men's Online Service has NOW gone Nationwide!

- ◆ Local access from over 1,000 US cities!
- ◆ Live uncensored group & private chat!
- ◆ Online, interactive, multi-player games!
- ◆ Lively salon style public forums!
- ◆ Over 20,000 Adult rated GIFS & files!
- ◆ MatchMaker online databases!
- ◆ 50+ lines available 24 hours a day!
- ◆ Gay owned and operated, your
privacy assured!
- ◆ Much, much more!

For your local access number,
information, & sign-up, CALL:

(415) 703-8200

Set modem to 8N/1. You must be 21 or older.
Finally...a national Adult Gay Men's BBS!

5EYE CONTACT

WORLD CLASS BBS-ADULT GRAPHICS ON-LINE

A revolution in on-line entertainment where the on-line world meets

BBS NUMBERS

64 lines 14.4k v32bis 8/n/1

- 800-466-6336 — USA
- 503-697-5100 — Anywhere
- COMPUSERVE — World-wide

Call us direct via Compuserve
Membership not required

USA Mainland host name (EVENT)
INTERNATIONAL host name (EVENTI)

On-Line for 10 years Most successful BBS

As featured on TV:

"A Current Affair",
"Computer Chronicles"

"CBS NEWS", "CNN" and read in
TIME Magazine, Boardwatch,
New Age Media
Cybersex, Newsweek
to name a few

ENDLESS ON-LINE ENTERTAINMENT

SuperVGA 1024x768x256
Movies at 30fps SVGA!
Video for Windows/AVI/GRASP/FLI/FLC
COLOR MOVIES SUPPORTING
VGA/SVGA/FLI/FLC/SOUNDBLASTER
MOUSE/AM/EMS
RIP Graphics - The best games on-line
The Center of Infinity
The Black Hole Playground
Journey Through the Universe
Escape from Languor
Easy User Interface
Home of "MaxiPic"

CHAT SYSTEM - LIVE ADULT NATIONAL LINK - MASSIVE COLLECTION ORIGINAL IMAGES AND SOFTWARE. 30,000 USERS.
ASTRONOMY • HUGE ADULT AREA • SCENIC • GRASP • ANIMATOR 3D • GAMES UTILITIES • IMAGE CONVERTERS

CIRCLE 612 ON READER SERVICE CARD

Let Us Blow Your Hardware!

TERI WEIGEL • TRACI LORUS • SAVANNAH

Taylor Wayne • Bianca Trump • Ashlyn Gere • Tianna Taylor
Fallen • Jeanna Fine • Zara Whites • LuLu Devine • Chessie Moore • Ashley Nicole
Selena Steele • Cassidy • Alicia Rio • Tracy West • Tawny Peaks • Crystal Storm
Deena Duos • Madison • Ashley Sinclair • Devon Shire • Pandora Peaks

PHOTO CD'S

952...Wicked w/ Kodak Access Software	\$69.88
961...Mark of Lara	\$49.88
962...Cat & Mouse	\$49.88
965...Heaven	\$49.88
966...Double Play I	\$49.88
967...Double Play II	\$49.88

INTERACTIVE CD'S

963...Penthouse Interactive	\$129.88
974...Adult Movie Almanac	\$99.88
958...Seymour Butts	\$69.88
969...Scissors-n-Stones	\$69.88
957...Paradise Club Interactive	\$49.88
959...Digital Dancing	\$59.88
950...Nightwatch Interactive	\$59.88
968...Dream Machine	\$69.88
971...After Midnight Screen Saver	\$59.88

MULTI-MEDIA MOVIES

976...The Other Side of Chelsea	\$49.88
977...Deception	\$49.88
980...Hidden Agenda	\$49.88
975...Beverly Hills 90269	\$49.88
978...Murphy's Brown	\$49.88
979...The Fisherman's Wife	\$49.88
954...Wicked	\$39.88
955...Betrayal	\$39.88
956...Cat & Mouse	\$39.88
947...The House of Sleeping Beauties	\$49.88
960...Legends of P*rn 2	\$29.88
972...Traci, I Love You	\$29.88
973...New Wave H*kers	\$29.88
985...Secrets	\$29.88
986...Hidden Obsessions	\$29.88

GUARANTEED LOWEST PRICE!
WE MATCH ANY ADVERTISED PRICE!!

ALL FAX & MAIL ORDERS RECEIVE FREE 2ND DAY UPGRADE
Department 63, P.O. Box 4188, Deerfield Beach, FL 33442



STAR WARE

VISA

CIRCLE 613 ON READER SERVICE CARD

MISSION CONTROL

Call (800) 999-7995
(201) 677-1400

Photo CD's

American Girls	39
Asian Palace	29
B. Babes 2	44
Bodacious Beauties	44
Double Play I	49
Girls of Vivid	49
Northern Delights	44

Movies

Amorous Asian Girls	59
Bare Assets	49
Barlow Affair	29
Best of Vivid	49
Bikini Beach	44
Blonde Justice	29
Busting Out	39
College Girls	44
Condo Cuts	44
Erotic Cafe	59

Hidden Obsessions	29
House of Beauties	39
House of Dreams	39
Insatiable	29
Legends of P*rn 2	29
Mystique of Orient	49
New Wave H*ks	29
Rain Women	59
Raquel Released	49
Traci I Love You	29
Wicked	49

Interactive

101 Sexual Positions	49
Adult Almanac	79
Best of Inferno	29
Buttman's Vacation	39
Madam's Family	49
Massive M***s	59
Night Watch	49

BY NEW MACHINE

Adventures of Seymour Butts

Follow the adventures of Seymour Butts and his camera and help him meet and mate with the girl of his dreams. This full length interactive quicktime adventure features over 90 minutes of digital video. **\$69.**

Dream Machine

The most innovative CD ever! Navigate through a 3D world where your ultimate fantasies come alive. The Dream Machine's beautiful hostess will lead you on an interactive journey through your sexual imagination. **\$69.**

Dirty Debutantes

Interact with Adult Stars while they were still amateurs in this erotic game shot by Ed Powers. If you don't make the right choices, Ed will get it. First timers on CD Rom include include Tabatha Cash, Chelsea Lynx, Teri Weigel & many more! **\$69.**

SEND ORDERS TO: Mission Control
Software 356 Glenwood Avenue * Dept.
PCMS1794 * E. Orange, NJ 07017 (You must be over 21 to order) We accept Master, Visa, Discover, Checks & Money Orders. Please include phone number. Shipping \$5. UPS Ground, \$7. UPS 2 Day, International Shipping \$25 Minimum.

FAX (201) 677-9484

CIRCLE 615 ON READER SERVICE CARD

GAY MODERN

FREE ACCESS

Instant Chat & Download
Gay Owned & Operated
Original Gay GIFs
Chat with Guys
Leather Shopping Mall
Matchmaker
Video Reviews
Video Stars...Donnie Russo, etc.
70 lines up to 16.8k

1-217-792-3671

Use your Modem to Dial
Customer Support Voice Line 415-881-3154

CIRCLE 616 ON READER SERVICE CARD

ImageCore

Digital Online Magazine

America's Premier BBS
Exclusively Offering
Subscribers:

Heidi's Girls
Beverly Hills Most Famous
Alleged Madam's Girls
DIGITAL EXCITEMENT
Teri Weigel Star of Wicked
People n Pictures
London's Page Three Girls

Subscribe Today
Use your Modem 8-N-1
Must be Adult to Access

818-752-1380

FREE**SOFTWARE**

The Exchange®
A BBS for the 21st Century
Thousands of Free Programs

- Windows
- DOS
- OS/2
- Word Processing
- Games
- Database
- Photos
- E-Mail
- Live Chat and More!
- Discount Computers & Supplies
- Local Access from Over 600 Cities

We're only a phone call away!
1-800-922-3556
Local: 619-578-6969
Voice: 619-578-6969

CIRCLE 614 ON READER SERVICE CARD

FREE

BodyCello Adults Only CD Sampler

Sample 20 demos of the finest in adult entertainment software.

Check out new interactive titles like Desktop Voyeur, The Fox Pack and Desktop Mistress.

Beautiful nudes and artwork from world-renowned artists.

MAC & MPC CD-ROM #555

*Just send \$4.75 for postage/handling in U.S.
(Outside the U.S. & Canada send \$15)

1-800-922-3556

Must be 21 to order. Dealer Inquiries Welcome.

CALL FOR A FREE COLOR CATALOG!

BodyCello • P.O. Box 910531 • Sorrento Valley, CA 94191
619-578-6969 • FAX: 619-536-2397

CIRCLE 615 ON READER SERVICE CARD

**HEAT
IN THE
NITE!**

America's only FREE, no membership fee
ADULT BBS, 1000+ calls daily,
10,000+ users. 00:00 male-female rolls,
14,000+ users. 27 lines! ACTION 24 hrs a
day guaranteed. The cache where FRATIG
singles and couples MEET!

NEVER A CHARGE! HOT!

One of the hottest top 100 BBS's
as rated by Bards of the Keyboard Magazine!

1-515-945-6227

Must be 21 to access

FOR ADULTS ONLY

You must be over 21 to
access

LIFESTYLE

Meet sexy singles/couples
on the world's hottest adult
chat system—Lifestyle BBS.
Less than .30 per hour.

Log on: 516-689-5390

—AND—

GRAFIX

Computer pictures so hot
they could melt your modem.
Log on: 516-689-2853

SUPER CHEAP • 100% PRIVATE

Local access from 500+ cities

CIRCLE 622 ON READER SERVICE CARD

SEXY MODEM

Call from home or office!

• The Ultimate BBS •

- **UNLIMITED ACCESS**
- 100,000 Shareware & GIF's, Windows, Mac and DOC files
- Free Internet Accounts
- Sexy Network Chat with Singles and Couples
- Unlimited Downloads
- Up to 16.8k on all 96 Lines
- New GIF's posted daily by our photographers

1-217-792-3663

Use your modem to access and be over 21 to access
Customer Support Voice Line 415-281-4429

CIRCLE 617 ON READER SERVICE CARD

**F
R
E
E**

Download the "SEXIEST" & most "STIMULATING"
Images from our ADULT On-Line Magazine - FREE!

LACE is an On-Line Magazine that offers you:

- **ABSOLUTELY** the best Color Photographs and Color Scans in the world & not available on any other BBS!
- **GORGEOUS** Sexy Models both Amateur & Professional!
- **VIDEO** for Window's Files, the latest & hottest Microsoft Product. Play these Videos on your computer and watch our models come to life for you. One on One. (.AVI)
- **LOCAL ACCESS** #'s for over 800 cities in the U.S.
- **ALL NEW FILES** in our FREE files AREA!
- **HIGH SPEED** access available. (14.4k down to 1200 baud)
- **AND... RATED #1 BY OUR USERS !!**

Set your Modem to 8-N-1 and your terminal emulation to ANSI

(818) 709-4275

Questions? Call our voice line at (818) 709-3795

LACE

the on-line adult magazine

May Only Be Accessed by Adults • Limited Offer

**G
I
F
S****FREE ADULT CD-ROM**

Don't spend your hard earned money on Adult CD-Rom's, unless you can be assured that the quality meets your expectations.

I'm Richard Stevens, the editor at REG Publishing and I've been ripped off so many times buying Adult CD-Rom's. All I ever got was pirated fuzzy images off of Bulletin Boards or contrasty images scanned right out of men's magazines & other assorted junk! Sometimes, nice photos, but terrible scans. Definitely not worth the MONEY!

At REG we deliver a quality product that features Gorgeous Centerfold Models and beautiful Color Scans. Experience our interactive Window's viewing program and sample images from our hottest selling CD-Rom's. *All I ask is that you pay a postage/handling fee of \$4.95 in order to receive this FREE* sample Adult CD-Rom.

To receive your FREE* ADULT CD-ROM, state age when ordering and mail your request with \$4.95 (Outside US/Can \$15) to:

REG Publishing - Dept. 1CF
POB 5138, Chatsworth, CA 91313.

Or call (818) 993-5629 and place your order by telephone. Visa/MasterCard and AMX accepted.

Call for a FREE Catalog.

Ask about our Centerfold Series Vol. 1 & 2 or Lovers Vol. 1. Dealer inquiries invited. Adults Only. Need Windows 3.1. Will work with Dos & Mac viewing programs, too!

CIRCLE 619 ON READER SERVICE CARD

PENTHOUSE O.N.L.I.N.E

THE BEST OF PENTHOUSE
AND MORE!

- Sizzling GIFs of Pets, Lovesets, More
- Hot Live Chat
- Fast "photo preview"
- Highest Quality Files
- 9600/VGA
- Penthouse, Variations Letters
- "Photo Email"
- Local call from most areas
- Affordable rates

For Modem signup call
1-619-546-2364 (8-N-1)
Info: 1-619-546-2360
21 or older only

THE 'INFAMOUS' GaRBaGe DuMP

CAUTION



ADULTS
AT PLAY

505-294-5675

via Modem

FREE Trial Accounts
Available

CIRCLE 620 ON READER SERVICE CARD

Where Adults Come To Play!

The World's Choice For
HOT MODEM FUN!

- Great For Couples and Singles!
- CHAT LIVE With Thousands of Ladies and Gents in Groups or Private!
- Tons Of Sizzling Hot Message Areas!
- Large GIF and Shareware Libraries!
- Matchmaker "DATING-BASE"!
- Live Competitive Tournament Gaming!
- NEW Modem to Modem Gaming!
- Local Numbers In Over 800 Cities!
- Plus Much Much More!

ODYSSEY
ONLINE

CALL NOW BY MODEM For Special Promos
& Information On Our Newest Features
Including INTERNET Access!

Over 21 **818-358-6968** 001

CIRCLE 621 ON READER SERVICE CARD



Secret City
MULTIMEDIA INC.

FREE CD ROM ADULT SAMPLER

Sample demos of the finest in adult entertainment send \$4.75 for postage and handling.

LOWEST PRICES • HOTTEST TITLES

INTERACTIVE: CD ROM

High Society Hot Wire

Seymore Butts Vol 1 & 2

Night Watch Vol 1 & 2

Dungeon of Dominance

The Maddams Family

MOVIE & PHOTO CD ROM'S

Heldi Fleiss's Girls

Asian Palace

Hundreds of new titles available.

MUST BE 21 TO ORDER

800-643-4205

(818) 786-0995 • FAX (818) 786-7018

8818 Van Nuys Blvd., Van Nuys, CA 91401

CIRCLE 623 ON READER SERVICE CARD

PC Magazine's BusinessCard section is a forum for innovative, hard-to-find and low-cost PC products and services. Ads are listed by product category and include Reader Service numbers to allow fast, easy response.

RATES:

1 issue—\$800, 3 issues—\$700, 6 issues—\$680,
12 issues—\$640, 17 issues—\$610, 22 issues—\$600.
Multiple-ad per issue rates also available. Prepayment
must accompany each insertion. VISA/MC welcomed.

AD FORMAT:

PC Magazine will typeset each BusinessCard ad.
Advertisers should furnish typewritten copy. Ads include:
1) Headline (1 line, initial caps=30 characters max, all
caps=25 characters max), 2) Descriptive copy
(5 lines, 225 characters max), 3) Company name (same
specifications as headline), and 4) Address and telephone
number (2 lines, 40 characters per line). No logos, art-
work or camera-ready ads. Publisher reserves the right
to edit supplied copy to meet section specifications.

DEADLINES:

PC Magazine is published 22 times a year, (bimonthly
except for July and August). The BusinessCard
closing is approximately two months prior to issue
date.

Please send copy and payment to:
PC Magazine BusinessCard
One Park Avenue, 3rd Floor
New York, NY 10016
For more information, call 800-825-4237
or 212-503-5115, FAX: 212-503-5860.

IDENTIFICATION BAR CODING

BAR CODE DISCOUNT WAREHOUSE

will not be undersold! Your source for all your
bar code needs. Laser and CCD scanners, mag
stripe and wedge readers, bar code printers and
software. We offer major brands at the best prices.
1-800-888-BCDW

BAR CODE DISCOUNT WAREHOUSE

14761 Pearl Rd., #257, Strongsville, OH 44136
Tel: (216) 273-4746 Fax: (216) 273-4623

CIRCLE 651 ON READER SERVICE CARD

CD-ROM

UNIX ON CD-ROM

New LINUX PLUS CD-ROM is now available!!!
X-Windows with TCP/IP, NFS
Development Environments with Sources
Free BSD Slackware /././
Install directly from CD/ROM, All CD/ROM drives.

TRANS-AMERITECH

23424 Walsh Ave., Santa Clara, CA 95051
408-727-3883 Fax: 408-727-3882

CIRCLE 656 ON READER SERVICE CARD

CD-ROMS-MAC-IBM-SEGA-CDTV

Prevue CD-ROMS. We carry all popular formats.
Karaoke, Art, Lit, D/Top Publishing, Fonts, Utils,
Education, Graphics and above all — GAMES.
Apply Prevue to buy or return to prevue more.
FREE CATALOG 1-800-433-2938.

WEDGWOOD RENTAL

5316 Woodway Dr., Fort Worth, TX 76133
1-800-433-2938 or 817-292-7353

CIRCLE 681 ON READER SERVICE CARD

BATTERIES

YOU DESERVE LONGER LIFE!

Why does your "2-hr" battery only last 15 minutes?
Try our extra long life Battery Packs, Chargers &
Conditioners for Notebook, Cellular & Camcorders.
Call or write us today for free catalog & guide to
longer battery life! Guaranteed low \$! V/MC or P.O.

POWER EXPRESS

4976 Stuckey Drive, San Jose, CA 95124-5120
800-769-3739 (8A-5P PST) Fax: 408-559-5969

CIRCLE 682 ON READER SERVICE CARD

FREE CD-ROM DISCOUNT CATALOG!

Hundreds of discounted CD-ROM titles, from \$8
up. Call or write for your free catalog.

Ellis Enterprises, Inc.

4205 McAuley #385, Oklahoma City, OK 73120
1-800-729-9500

CIRCLE 687 ON READER SERVICE CARD

CELLULAR PHONES

TWO PHONES - ONE NUMBER

Change NAM & ESN info on your PC for Motorola,
Mitsubishi, Panasonic, NEC Cellular Phones &
have an extension. Why pay two bills? Call our fax
on demand for details. Only \$495 with free techni-
cal support.

Cellular Press

421 N. Rodeo #15318 Beverly Hills, CA 90210
Fax/Demand: 800-438-4511 Ph: 310-289-2174

CONSTRUCTION

SERVICE MANAGEMENT SOFTWARE

Instant access to customer history. Automated
dispatching. Timely billing. Take charge of your
business with CMAS Plus, our integrated account-
ing/job costing/service management system for
specialty contractors.

DATA-BASICS, INC.

11000 Cedar Road • Cleveland, OH 44106
1-800-837-7574 • Fax (216) 721-2398

CUSTOMER SUPPORT

How to Handle Customer Support

Customer Response System™ tracks calls,
inquiries & problems. Quickly finds known solu-
tions. Easily routes work to others. Speeds
response via letter/fax writer & phone autodialer.
For LAN's & PC's. From \$499.

Syspro Corporation

PO Box 243, Orinda, CA 94563
Tel: (510) 254-9755 Fax: (510) 254-4377

CIRCLE 684 ON READER SERVICE CARD

DATA ENTRY

The Data Entry Emulator™

Full featured, heads-down data entry with two-pass
verification, edit language, operator stats, batch
control, output record reformat, on-line help, free
tech support. From \$395. LAN version available.

Computer Keyes

21929 Makah Road, Woodway, WA 98020
800-356-0203/206-776-6443/Fax: 206-776-7210

COMMUNICATIONS/NETWORKING

KEYBOARD, VIDEO, MOUSE

EXTENSION with EXTENDER
SPLITTING with COMPANION
SWITCHING with COMMANDER
Boosts SIGNALS UP to 600 FT. Control Up to
96PC's with one KEYBOARD and MONITOR.

CYBEX CORPORATION

4912 Research Drive, Huntsville, AL 35805
PHONE 205-430-4000 FAX 205-430-4030

CIRCLE 693 ON READER SERVICE CARD

New and Updated CDROM's

Cica MS Win 3000 Windows 3.1 Prgrms \$29.95
Giga Games 3000 Fun DOS/Windows Game 39.95
Simtel MSDOS 680 meg DOS Shareware 29.95
Hobbes OS/2 640 meg Free/Shareware 29.95

Walnut Creek CDROM

Guaranteed! 4041 Pike #d521 Concord, CA 94520
Visa/MC/AmEx 800 786 9907 Fax 510 674 0783

CIRCLE 698 ON READER SERVICE CARD

SOFTWARE BUSINESS

UPS Shipping Software

Works stand-alone or w/ your acctg SW (DacEasy,
Peachtree, Macola, Great Plains RealWorld etc.).
Calculates zone & charges, Prints Manifest, COD
tags, shipping labels. Optional carriers and scale
intl. Guaranteed UPS acceptance. 60-Day MBG.

V-Technologies

P.O. Box 6261, Wolcott, CT 06716
(203) 879-6960 Fax: (203) 879-6962

CIRCLE 694 ON READER SERVICE CARD

SOFTWAREVAULT COLLECTIONS

Critically acclaimed new releases! Thousands of
the best shareware programs and resources on
each collection. Complete libraries of best-selling
games, utilities, multimedia, etc. Six different col-
lections available!

AMERICAN DATABANKERS

5220 East 69th Place, Tulsa, OK 74136
DEALERS WANTED 1-800-775-4232

CIRCLE 699 ON READER SERVICE CARD

BILL \$100,000 A YEAR

As a Software Consultant
Log onto our BBS & download details & referrals,
BBS 407-547-8759

WORLD CLASS SOFTWARE, INC.

245 Elwa Place, West Palm Beach, FL 33405
Phone 407-585-7354 FAX 407-547-1703

CIRCLE 696 ON READER SERVICE CARD

CD ROM DIRECT OUTLET

Buy direct from manufacturer!
Hundreds of Windows, DOS, & Mac titles. List
includes programs, games, education, clipart, and
GIF files. ALL TITLES ONLY \$8.99 EACH!
MC/VISA, CALL FOR FREE LISTING.

INFINITI SYSTEMS, S.V.

4053 Clipper Court, Fremont, CA 94538
PH: 510-252-9030 FAX: 510-252-9039

CIRCLE 690 ON READER SERVICE CARD

EDUCATION

DERIVE®, A Mathematical Assistant

Half Price! DERIVE combines power of computer algebra with 2 & 3D plotting & menu-driven interface. Does symbolic & numeric equations, calculus, trig, vector & matrix algebra & more. Req:MS DOS computer, 1 floppy disk drive & 512K. \$125.

Soft Warehouse, Inc.

3660 Waiialae Avenue, Suite 304
Honolulu, HI 96816-3236 (808) 734-5801

CIRCLE 666 ON READER SERVICE CARD

Only Great Educational SW

Thinking Tools selects the best educational software, and helps you match the right product to your child's skill level, age, and area of interest. To order a buyer's guide call toll free now!

Thinking Tools

611 Webster St, Palo Alto, CA 94301
800-353-1845

CIRCLE 667 ON READER SERVICE CARD

ENGINEERING

SIMULATION

GPSS/PC™ is full-power version of the most popular mainframe simulation language, GPSS. Designed for interactive use on high-speed microprocessors, it has 6 graphics and animation windows. It predicts behavior of complex systems.

MINUTEMAN SOFTWARE

P.O. Box 171/B, Stow, MA 01775
800-223-1430/508-897-5662 Ext.316

CIRCLE 668 ON READER SERVICE CARD

FINANCIAL

Your Financial Fitness Expert!

Personal Budget 101™ will strengthen your financial muscle. On-screen help coaches you through simplifying your finances and managing your debt. It's no sweat! \$29.95 + \$5 S&H. MS-DOS. 3.5" or 5.25" disk. Chk/MO.

FINANCIAL TECHNOLOGIES

P.O. Box 44120, Lemoncove, CA 93244-0120
(209)597-2296

CIRCLE 669 ON READER SERVICE CARD

FOREIGN LANGUAGES

FRENCH SOFTWARE SALE!

Authorized dealer for 100's of French SW and CD-Rom titles from Lotus, Borland, MS, Symantec, etc. Original mfrs. version, all at discount prices. SPECIALS: Quattro Pro 5.0 \$59 MS Word Win 6.0 \$309 Excel 5.0 \$309 Smartsuite 2.1 \$299

ADP LTD.

TEL: (514) 335-6892 FAX: (514) 335-1089

CIRCLE 670 ON READER SERVICE CARD

ALL LANGUAGES AVAILABLE

Translators-Dictionaries-Tutorials-Fonts
Advanced PC Translation software fax out. English convert to Russian & other language. Spanish transtutorial \$39 wholesale prices. Best source - Best price - Best support. Call us.

TransLanguage Inc.

PO Box 18024 Anaheim Hills, CA 92807
Call 800-308-8883 or Fax 714-998-1296

CIRCLE 671 ON READER SERVICE CARD

GENEALOGY

Family Roots™

Do it YOUR way! Huge variety & capacity for your family history. Make pedigree & descendants charts, person & group sheets, indices, histories, address labels, searches, more. Call for FREE info. Satisfaction gtd. PC or Mac. MC/V/Amex/Discover

QUINSEPT

Box 216, Lexington, MA 02173
800-637-7668 617-641-2930

CIRCLE 672 ON READER SERVICE CARD

GENERAL

Student-Teacher-School SPECIAL

Pagemaker5.0 \$359-WordPerfect6.0 \$159-Q&A \$169 Morph \$90-Action! \$259-LotusWindows 4 or 3.4+ \$159-BorlandC++ \$219-Derive2.5 DOS \$250-dBase \$249 Coda-Finale \$299-Paradox4.0 \$249-Mathematica \$299-IBM/Mac Call for catalog!

PERIPHERALS PLUS, INC.

5016 Highway 9, HOWELL, NJ 07731
800-444-7369 908-363-2424 FAX:908-363-3687

CIRCLE 673 ON READER SERVICE CARD

HEALTH/FITNESS

NUTRITION SOFTWARE - \$11

3-disk/3prgm set. 1,200,000 prgms sold! Analyzes foods, workouts, fat, cholesterol, etc. Creates menus. Provides guidelines. Not shareware, not public domain. Send \$11 and specify disk size & IBM or Mac. SATISFACTION GUARANTEED.

OHIO DISTINCTIVE SOFTWARE

4588 Kenny Road, Columbus, OH 43220
614-459-0453

CIRCLE 674 ON READER SERVICE CARD

HUMAN RESOURCE MANAGEMENT

WINDOWS™-BASED HRIS

Facilitate HR management with HRVantage®. Designed using Microsoft® Access™. LAN compatible, capable of Windows' multitasking, file sharing & linking features. Innovative data analysis, data tracking & extensive reporting capabilities.

Spectrum Human Resource Systems

1625 Broadway•Suite 2700•Denver, CO•80202
(800) 4SPECTRUM (800) 477-3287

CIRCLE 675 ON READER SERVICE CARD

WORKWISE-EMPLOYEE FILE

REDUCE LEGAL EXPOSURE! Document performance, days off & attendance analysis, benefits, certification expirations, EEO-1 Data, Corp. mail. Great for evaluations & multi-location WINDOW-BASED. Dealers welcome. \$395.

Paradigm Software Development

2510 Western Ave #500 Seattle, WA 98121
Ph: 1-800-WORKWISE Fx: 1-206-728-8401

CIRCLE 676 ON READER SERVICE CARD

INVENTORY

WAREHOUSE INVENTORY

Barcodes identify receipts, locations, and shipments. Audit trails. Multi user. Multi languages. Options: EDI receive/ship, lottrack, expiration dates, markdowns, transfers. Connect scales, purch. orders, and cust. order entry.

BGD COMPUTER SYSTEMS, INC.

212 W. Front St. Statesville, NC 28677
Tel: 704-878-8877 Fax: 704-878-0398

CIRCLE 677 ON READER SERVICE CARD

INVENTORY MANAGEMENT

Stock-Master 4.0, com. grade system, has Stock Status Rptg, PO Write & Track, Trend Analysis, QC Rptg, Trans Hist Detail Analysis, Multi Loc support, BOM, Matl Req Planning, Serial/Lot No Track, Quote/Ord/Inv Prep.

Applied Micro Business Systems, Inc.

177F Riverside Ave., Newport Beach, CA 92663
714-759-0582

CIRCLE 678 ON READER SERVICE CARD

MAILING/MAIL ORDER

Mail Order Manager (™)

America's favorite integrated solution for mail/phone order business - order entry, credit card processing, UPS manifest, accounting, telemkt'g, mailing list mgmt & more! Single & Multi-user systems starting at \$1195. Working Demo \$25 (Ref)

Dydacomp Development Corp.

150 River Road, Ste N1 Dept.PCM, Montville, NJ 07045 Tel:800-858-DMOM or 201-335-1256

CIRCLE 679 ON READER SERVICE CARD

SoftSpoken Mailer for Windows

Print USPS-certified barcode on ordinary mailing labels. Presort 1st/3rd class for rates as low as 11.4¢! Get ZIP+4 & forwarding addresses. De-dupe lists. Easy Windows interface. Money-back guarantee. Call for free brochure!

Micro Computer Solutions Inc.

19225 Orbit Dr., Gaithersburg, MD 20879
Tel: (800) 536-1674 Fax: (301) 990-3155

CIRCLE 680 ON READER SERVICE CARD

MAINTENANCE/PREVENTIVE MAINTENANCE

MAINTENANCE MANAGEMENT

PC-based system for the small to medium size business. FEATURES: Work Orders (space for detail instructions & safe work procedures), equipment descriptions, historical data, operating & analytical reports, inventory. Write for free Demo!!

PENGUIN COMPUTER CONSULTANTS

P.O.Box 20485, San Jose, CA 95160
800-521-0545 (408)997-7703 Fax (408)927-0570

CIRCLE 681 ON READER SERVICE CARD

MANUFACTURING

Over 3,100 Satisfied Users!

Mfg. inventory control, multi-level BOMs, integrated purchasing costs \$1995. Optional scheduling module w/work orders, time-phased prod.scheduling, & MRP \$800. \$ back guarantee. Feature-rich demo prints 60+sample reports — Just \$5. V/MC/Amex

Microcomputer Specialists, Inc.

P.O. Box 795, Woodstock, VT 05091
Call toll-free 1-800-833-1500

CIRCLE 682 ON READER SERVICE CARD

pc/MRP ACCTING/MFG SOFTWARE

pc/MRP's 12 integrated modules include Inventory, BOM, Sales, Purchasing, Receiving Invoice, StkRoom, WorkOrder, Addr, GL,AP,AR Working Demo w manual \$35.00 Sm Single User \$179.00, Multi-user \$695.00

Software Arts

PO Box 3621 Santa Clara, CA 95051
PHONE 408-248-6445 FAX 408-247-8610

CIRCLE 683 ON READER SERVICE CARD

MAPPING

Geo Whiz Desktop Map & Database

\$129.95 gives you US maps. Overlay your data on maps with several options. • 360K miles of roads & Hwys • Variable zoom • Find lat/long coordinates • Import/export data • Print maps. Options: 5-digit zip database, Detailed county maps

KOSITZKY & ASSOCIATES, INC.

1801 Greenbrier Pl. Ste. J, Okc., OK 73159
PH: 405/692-1683 FAX: 405/692-1698

CIRCLE 64 ON READER SERVICE CARD

MEDICAL

PRACTICE BILLING

MD VersaForm, flexible, ledger based design, billing package. Programmable; customizable reports, files, & screens; includes database mgmt system & full source. ECS, LAN support. \$1,295 sgl user. Free lit & demo. Dirs wanted.

Applied Software Technology

591 W. Hamilton Ave., Ste 201, Dept. 99
Campbell, CA 95008 (800) 678-1111 Ext. 99

CIRCLE 65 ON READER SERVICE CARD

Lytec Medical/Dental

Advanced practice mgmt for DOS & Win. Patient & insurance billing, accts receivable, electronic claims, practice mgmt, prnl info mgmt, prnl fin., sched., graphics, laser forms, multi-user, multi-provider & more. 60 day money back guarantee.

Lytec Systems, Inc.

7050 Union Park Center, Suite 390 Midvale, UT 84047
Tel: 1-800-735-1991

CIRCLE 66 ON READER SERVICE CARD

PRACTICE BILLING - Software

Nationwide use since 1979. ELECTRONIC CLAIMS. Full support. Simple Q/A. Full pt. ledgers, stmts, reports, everything. Tutorial. On-line help. LAN compatible. Physician designed. Single User: \$495+. Newsletter, FREE WORKING DEMO, virus free.

Physicians' Office Computer

1240 Kona Drive, Rancho Dominguez, CA 90220
800-782-5214

CIRCLE 67 ON READER SERVICE CARD

MUSIC

SongWright Out Scores The Rest

"Impressive output...solid list of features." An Electronic Musician survey proves SongWright the BEST BUY of all music notation software. Save hundreds of dollars. Make your music easy with SongWright. Only \$119.95.

SongWright Software

7 Loudoun Street S.E., Leesburg, VA 22075
(800) 877-8070 (703) 777-7232

CIRCLE 68 ON READER SERVICE CARD

PROGRAMMERS TOOLS

Translate dBASE programs to C

CodeTranslator converts dBASE programs into working C applications. This turbo charges slow dBASE applications, helps you port to Unix, MS Windows, or OS/2, and helps dBASE programmers learn C easily. Call now for more info.

SEQUIER SOFTWARE

#209, 9644-54 Ave, Edmonton, AB, Can. T6E 5V1
Call (403) 437-2410 Fax (403) 438-2999

CIRCLE 69 ON READER SERVICE CARD

Visual Basic Programming Tools

Add-on tools for VB, VB_DOS, QuickBASIC and PDS, all with tutorials and full source. Custom controls, DLL's, general purpose toolboxes, assembly routines, graphics, screen design, TSR's and much more. No royalties. Free demo & catalog.

KOSRENT SOFTWARE, INC.

11 Bailey Avenue, Ridgefield, CT 06877-4505
Tel: (203) 438-5300 Fax: (203) 431-4626

CIRCLE 70 ON READER SERVICE CARD

DON'T WRITE NETWORK APPS!

Without NPPC, powerful subroutine library that handles the details of IPX and NetBIOS programming. DOS & Windows. \$ back guarantee. Royalty free. Download the free demo from our BBS. \$195 or \$395 with source.

SOFTWAREHOUSE CORPORATION

326 State Street, Los Altos, CA 94022
415-9490203 Fax 415-9490208 BBS 415-9490207

CIRCLE 71 ON READER SERVICE CARD

REAL ESTATE

Property Management

With Rental-Ease save \$5 on your investment! Guaranteed to be the easiest & fastest property management system available at any price. Versions for owners, professionals, networks. \$395 to \$1295. Demo \$10. Dealers welcome!

Strategic Office Systems

688 N.500 W.#61, Mt. Pleasant, UT 84647
(800) 942-6784 or (801) 462-2130

CIRCLE 72 ON READER SERVICE CARD

The Landlord® & The Landmaster®

Property management software purchased by more than 5,000 owners and property managers since 1980. Handles residential and commercial tenant accounting; prints checks and statements. G/L and A/P included. From \$595 to \$2200.

The Landlord Software Center

427 East Patrick Street, Dept. E
Frederick, MD 21701 (301) 695-1544

CIRCLE 73 ON READER SERVICE CARD

RELIGION

CHURCH MANAGEMENT SOFTWARE

Membership, contributions and accounting software that saves big on church mailing costs with bar codes and carrier routes. PowerChurch Plus includes church fund accounting, A/P and payroll for \$795. Call today to order free info in the mail.

F1 SOFTWARE

208 Ridgefield Drive, Asheville, NC 28806
1 (800) 486-1800

CIRCLE 74 ON READER SERVICE CARD

QUR'AN & ISLAMIC SOFTWARE

The Alim lets you search and study the Qur'an, Hadith, Figh, Islamic history, biographies, commentaries, dictionaries, concordances, and more! All in one inexpensive integrated package with both Arabic and English support!

ISL SOFTWARE CORPORATION

2037 Featherwood St, SS, MD 20904 USA
800-443-3636, 713-893-0805/0558 fax

CIRCLE 75 ON READER SERVICE CARD

SCIENTIFIC

CoVis - Visualization Software

A unique new tool for scientists and engineers. Nine types of 2D and 3D animated scientific graphs let you animate, spin, and explore large data sets in ways that were difficult or impossible before. \$395

CoHort Software

P.O. Box 1149, Berkeley, CA 94701
(800) 728-9878 Fax (510) 524-9199

CIRCLE 76 ON READER SERVICE CARD

EXPERIMENTAL DATA FITTING

SCIENTIST, now on Windows®, fits experimental data to any combination of user-defined algebraic and differential equations, and Laplace transforms—also determines best-fitting splines, polynomials and interpolating functions.

MicroMath Scientific Software

Box 21550, Salt Lake City, UT 84121-0550
1-800-942-6284 Fax (801) 943-0299

CIRCLE 77 ON READER SERVICE CARD

STATISTICS

NCSS 5.x Series - \$125

"Best value & easiest to learn/use" PC-Week. Menus/Spreadsheet. Means, etc. Regression, t-tests, ANOVA. Factor, cluster & discriminant. Cross tabs. Nonparametrics. Histograms. Plots. Reads ASCII/Lotus. Many extra modules.

NCSS

329 North 1000 East, Kaysville, UT 84037
Phone: 801-546-0445 FAX: 801-546-3907

CIRCLE 78 ON READER SERVICE CARD

SURVEYS

The Survey System

Analyzes: marketing, public opinion, customer satisfaction, employee attitude surveys. Handles mail, personal, phone, scanner, disk-by-mail or computer interviews. Records verbatim text & voice answers. Powerful, flexible, user friendly. Free support.

Creative Research Systems

140 Vista View #100, Petaluma, CA 94952-4728
Ph: (707) 765-1001/Fax (707) 765-1068

CIRCLE 79 ON READER SERVICE CARD

UTILITIES

PEN PLOTTER EMULATOR

FPLot turns your printer into an HP pen plotter. Fast h-lines, no jagged lines. Vary line width, color. Screen preview - zoom, pan. Works with most CAD programs. Supports most printers. Requires DOS 2.1 or higher. \$119+\$3 S&H. VISA/MC/Chk/MO.

FPLot Corporation

24-16 Steinway St., Suite 605
Astoria, NY 11103 • 718-545-3505

CIRCLE 80 ON READER SERVICE CARD

VOICE/FAX

Write your own Voice Mail software

Create advanced, multi-line voice/fax mail systems with VOS™, the Editors' Choice. Complete language for computer/telephone integration. Call for free booklet "Get into Interactive Voice".

PARITY SOFTWARE

870 Market St., #800, San Francisco, CA 94102
415-989-0330 (Fax: 415-989-0441)

CIRCLE 81 ON READER SERVICE CARD

BOOKS/CATALOGUES

Hi-Tech Computer Manuals

Virtual reality, interactive entertainment, artificial intelligence, graphics, the macintosh, the latest technology in print. Many hard to find titles, some available with software. 30 day M.B.G.'s. Write for free catalog.

North Distributors

260 Davis Dr, Suite 303 Newmarket, Ont L3Y7C3
CANADA

CIRCLE 702 ON READER SERVICE CARD

DATA CONVERSION

TAPE CONVERSION & DUPLICATION

ALL TAPE TYPES (1/4", TEAC, 4mm DAT, 8mm EXABYTE, DEC TKxx, 1/2", 3480, 3490) & All Formats (MICRO, NETWORK, UNIX, MINI & MAIN-FRAME) - Very Fast Turnaround & Realistic Pricing. Full Service for Data Recovery including Overwrites.

VOGON

USA 405-321-2585 Fax: 405-321-2741
UK 44+(0)734-890042 Fax: 44+(0)734-890040

CIRCLE 703 ON READER SERVICE CARD

SUPPLIES

TAPES & DISKETTES CHEAPII

2000	2120	600A	6150	6250	6525
Maxell	10.00	13.50	14.25	14.50	17.25
Verbatim	11.00	14.50	15.25	15.50	19.50
3 M	11.25	14.75	15.50	16.25	20.00
3 1/2 HD Formatted Plastic Case w/labels @.60					

TJ ENTERPRISES

405 South Main Street, Urbana, OH 43078
Tel: 1-800-280-3475 Fax: (513)-652-4720

CIRCLE 714 ON READER SERVICE CARD

DATA RECOVERY SERVICES

ONTRACK DATA RECOVERY

Ontrack is the leader in professional data recovery services - recommended by Conner, Iomega, Maxtor, Micropolis, Quantum, Rodime, Seagate, Western Digital, & others! See our ad in the Classified section for more information.

Ontrack Data Recovery

MN: 1-800-872-2599 • CA: 1-800-752-7557
UK: 44-81-974-5522 • Germany: 0130-815-198

CIRCLE 709 ON READER SERVICE CARD

TRAINING/TUTORIALS

Rent MacAcademy Videos by Mail

Video's the easy way to learn! All major Mac programs available: over 85 different titles, each 2 hours long. A two week rental including S&H, costs less than a dollar a day. Return postage is prepaid. Get a free catalog.

CareerTAPES® Enterprises

PO Box 309 Center Harbor, NH 03226
(603) 253-7470

CIRCLE 715 ON READER SERVICE CARD

COMPUTER INSURANCE

Insures Your Computer

The COMPUTEROWNERS™ insurance policy repairs or replaces hardware, media and purchased software. Rates as low as \$49 a year covers theft, fire, accidents, power surge and more! Call for immediate coverage or info. 1-800-800-1492.

Safeware, The Insurance Agency Inc.

2929 N. High St., PO Box 02211, Columbus, Ohio 43202
1-800-SAFEWARE

CIRCLE 704 ON READER SERVICE CARD

SCANNING SERVICES

HIGHEST AWARD WINNING IMAGES

Your full color photos, slides or transparencies can be enhanced retouched framed text added and output to your computer via disk, CD-Rom or put on VHS tape etc. GO GRAPHICS on CIS to see all our Hall of Fame Winners! Chk/MO/VISA/MC

SPECTRUM SCANNING

11631 N. Cave Creek Rd. Phoenix, AZ 85020
800-822-6200 bbs602-997-6500 cts76702.1316

CIRCLE 710 ON READER SERVICE CARD

Multimedia Training Workshop

The three day workshop covers animation, authoring, audio, graphics, and video. Workshops are held in Chicago or on site. For registration and more information, call or write:

TACC Inc.

PO Box 3993 Naperville, IL 60567-3993
(708) 897-2749

CIRCLE 711 ON READER SERVICE CARD

**88% OF PC MAGAZINE SUBSCRIBERS PURCHASED
COMPUTER PRODUCTS DIRECT IN THE PAST 12 MONTHS ...**

% OF SUBSCRIBERS

- ▶ Software
- ▶ Peripherals
- ▶ Supplies
- ▶ Computers
- ▶ Networking Products

79%

61%

57%

48%

14%

**Sell your products direct here, call your
Marketplace account representative today at
800-825-4237**



Here's the Most Comprehensive Source of Computer Information Anywhere



EVALUATE:
Competitors' products and marketing strategies, instantly.

FIND:
Tech support, sales, and fax numbers. Addresses and company stats too.

COMPARE:
New products. Know where you stand, whether you're buying or selling.

“...tons of useful information about the industry, including a year's worth of articles from every conceivable computer-related publication.”

John C. Dvorak, PC/Computing

“...Computer Select provides not just the information we need, but also a way to find it and a convenient way to store it.”

Esther Dyson, Editor, Release 1.0

GET:
Accurate, up-to-date information to make informed decisions.

LOCATE:
Hard-to-find products for special needs.

DETERMINE:
Whether products are compatible with your current equipment and systems.

LEARN:
Tips and techniques to improve hardware and software performance.

SAVE:
Time and money. Access thousands of articles and product specs that'll help you make better decisions.

Computer Select

The Fastest, Easiest Way to Get Computer Product and Industry Information

- 75,000 articles from over 160 publications
- Over 13,000 company profiles
- 75,000 product specs
- Updated monthly

Call **1-800-827-7889** ext. 2202

Federal Government Employees: Call 1-800-759-9103

*One free disk when you subscribe.

©1993 Ziff Communications Company. Computer Select is a registered trademark and Computer Library is a trademark of Ziff Communications Company. All rights reserved.





COMPUTER DISCOUNT WAREHOUSE™

WHY PAY RETAIL? CDW® Sells For Less!

IBM ThinkPad® 500

A powerful, truly personal computer

Now you no longer have to trade performance for size and portability in a sub-notebook computer. The ThinkPad 500 gives you everything you need to take your business on the road—anytime, anywhere—in a compact, 3.8lb package that doesn't sacrifice an ounce of power or versatility. It's also fully backed by HelpWare®, IBM's world-class service and support offerings.

- IBM 486SLC2 50/25 Mhz CPU ■ 4MB RAM Std., 12MB Max. ■ 85MB or 170MB hard drive
- Type II PCMCIA slot ■ 7.4" backlit monochrome STN-LCD, 64 gray scales ■ Standard external 1.44MB 3.5" floppy drive ■ Battery life: 3+ hours, includes AC charger ■ Serial, external floppy, parallel, external VGA ports ■ TrackPoint II pointing device on keyboard ■ Pre-loaded IBM DOS and Prodigy® (modem not included) ■ One year international warranty, 24 hr./7 day toll-free assistance

ThinkPad 500 w/85MB HD

ONLY \$1599.00

\$1599.00

CDW 39402

ThinkPad 500 w/170MB HD

ONLY \$1899.00

\$1899.00

CDW 33722



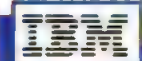
IBM PS/ValuePoint Computers... the best in affordable high performance computing

ValuePoint models SI, Desktop & Tower listed in this ad include:

- ◆ One year on-site warranty ◆ 16 bit ISA data bus ◆ 4 SIMM sockets total (3 open) ◆ OverDrive™ Upgradability ◆ Pentium™ ◆ OverDrive P24T ready (except 425SX Si) ◆ 16 bit IDE hard drive interface ◆ VESA local bus video ◆ 128K Flash Memory BIOS ◆ IBM PC DOS 6.1 & Windows 3.1 pre-loaded (hard drive models only) ◆ 100W power supply (Si-space saver models) ◆ 200W power supply (T-tower models, D-desktop models, P-Pentium models) ◆ Mouse

ValuePoint Pentium models listed in this ad include:

- ◆ One year on-site warranty ◆ 64 bit ISA data bus ◆ (1) 32 bit PCI local bus expansion slot ◆ (1) Shared 32 bit PCI local bus/16 bit ISA expansion slot ◆ (2) 16 bit expansion slots ◆ 4 SIMM sockets total (2 open) ◆ 273 pin Zero Insertion Force (ZIF) processor socket ◆ Future OverDrive ready ◆ 16 bit IDE hard drive interface ◆ PCI local bus video ◆ 128K Flash Memory BIOS ◆ IBM PC DOS 6.1 & Windows 3.1 pre-loaded (hard drive models only) ◆ 200W power supply ◆ Mouse



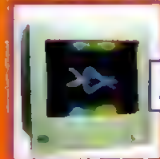
Tower Models



Pentium Models



SI Models



Value Models

Model	Drive	CPU	RAM	Max	Slots	Days 3.5(5.25)	CDW	Price
425SX/SI	none	i486SX/25	4MB	64MB	3 (ISA)	2(1)	37126	\$719 00
425SX/SI	120MB	i486SX/25	4MB	64MB	3 (ISA)	2(1)	37127	\$895 00
425SX/SI	212MB	i486SX/25	4MB	64MB	3 (ISA)	2(1)	37128	\$995 00
433DX/SI	None	i486DX/33	4MB	64MB	3 (ISA)	2(1)	37129	\$1089 00
433DX/SI	120MB	i486DX/33	4MB	64MB	3 (ISA)	2(1)	37130	\$1259 00
433DX/SI	212MB	i486DX/33	4MB	64MB	3 (ISA)	2(1)	37131	\$1389 00
466DX/SI	none	i486DX/2/66	4MB	64MB	3 (ISA)	2(1)	38533	\$1479 00
466DX/SI	120MB	i486DX/2/66	4MB	64MB	3 (ISA)	2(1)	37132	\$1659 00
466DX/SI	212MB	i486DX/2/66	4MB	64MB	3 (ISA)	2(1)	37133	\$1759 00
425SX/D	none	i486SX/25	4MB	64MB	5(ISA)	3(2)	37134	\$1050 00
425SX/D	170MB	i486SX/25	4MB	64MB	5(ISA)	3(2)	37135	\$1219 00
425SX/D	245MB	i486SX/25	4MB	64MB	5(ISA)	3(2)	37136	\$1319 00
433SX/D	none	i486SX/33	4MB	64MB	5(ISA)	3(2)	37137	\$1189 00
433SX/D	170MB	i486SX/33	4MB	64MB	5(ISA)	3(2)	37138	\$1359 00
433SX/D	245MB	i486SX/33	4MB	64MB	5(ISA)	3(2)	37139	\$1459 00
433DX/D	none	i486DX/33	4MB	64MB	5(ISA)	3(2)	37140	\$1389 00
433DX/D	212MB	i486DX/33	4MB	64MB	5(ISA)	3(2)	37141	\$1559 00
433DX/D	340MB	i486DX/33	4MB	64MB	5(ISA)	3(2)	37142	\$1719 00
450DX2/D	none	i486DX2/50	4MB	64MB	5(ISA)	3(2)	37143	\$1529 00
450DX2/D	212MB	i486DX2/50	4MB	64MB	5(ISA)	3(2)	37144	\$1699 00
450DX2/D	340MB	i486DX2/50	4MB	64MB	5(ISA)	3(2)	37145	\$1859 00
466DX2/D	none	i486DX2/66	4MB	64MB	5(ISA)	3(2)	37146	\$1729 00
466DX2/D	212MB	i486DX2/66	4MB	64MB	5(ISA)	3(2)	37147	\$2000 00
466DX2/D	340MB	i486DX2/66	4MB	64MB	5(ISA)	3(2)	37148	\$2159 00
433DX/T	none	i486DX/33	4MB	64MB	8(ISA)	4(2)	37149	\$1500 00
433DX/T	212MB	i486DX/33	4MB	64MB	8(ISA)	4(2)	37150	\$1679 00
433DX/T	340MB	i486DX/33	4MB	64MB	8(ISA)	4(2)	37151	\$1829 00
450DX2/T	212MB	i486DX2/50	4MB	64MB	8(ISA)	4(2)	37152	\$1819 00
450DX2/T	420MB	i486DX2/50	4MB	64MB	8(ISA)	4(2)	37153	\$2279 00
466DX2/T	340MB	i486DX2/66	4MB	64MB	8(ISA)	4(2)	37154	\$2269 00
466DX2/T	527MB	i486DX2/66	4MB	64MB	8(ISA)	4(2)	37155	\$2699 00
P60/D	424MB	Pentium/60MHz	16MB	128MB	2 (ISA) 2(PCI)	3(2)	37156	\$4039 00
P60/D	527MB	Pentium/60MHz	16MB	128MB	2 (ISA) 2(PCI)	3(2)	37157	\$4079 00

IBM Value Family SVGA, VGA, XGA Monitors

- ◆ Low emission MPRII compliant ◆ Easy color adjustment ◆ Borderless display ◆ Power management ◆ Energy Star compliant (except CDW 39403) ◆ ISO 9241-3 ◆ Auto multi-scanning ◆ Anti-reflective ◆ Anti-static ◆ Digital controls ◆ 1 year warranty

14" .28mm, 800 x 600 CRT	\$339.00	CDW 39403
14" .28mm, 1280 x 1024 CRT	\$419.00	CDW 34204
15" .28mm, 1280 x 1024 Flat Square Tube	\$569.00	CDW 39404
17" .28mm, 1360 x 1024 Flat Square Tube	\$979.00	CDW 39405

You Find a Better Price, Call CDW Before You Buy!

CDW® Sells for Less and Services You Better!
(800) 339-4CDW

PCM819

©1994 CDW® Computer Centers, Inc.

NEW!
Lease Option
Call for Details

COMPUTER DISCOUNT WAREHOUSE

FOR QUICKER RESPONSE

FAX TO

(800) 829-0692

Free Product Information

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL

PERMIT NO. 433

RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE



P.O. Box 1687
RIVERTON, NJ 08077-9687



READER SERVICE CARD FREE INFORMATION

IT'S AS EASY AS 1, 2, 3

1. Fill in your name and address and check off your answers to the nine research questions.

2. Circle the numbers on the card that correspond to the ads or articles you'd like more information about.

3. The literature will be mailed to you from the advertiser free of charge.

CIRCLE FOR FREE INFORMATION

Void after September 30, 1994

001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025	026	027	028	029	030	031	032	033	034	035	036	037	038	039	040	041	042	043	044	045	046	047	048	049	050
051	052	053	054	055	056	057	058	059	060	061	062	063	064	065	066	067	068	069	070	071	072	073	074	075	076	077	078	079	080	081	082	083	084	085	086	087	088	089	090	091	092	093	094	095	096	097	098	099	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350
351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450
451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500
501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550
551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600
601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650
651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700
701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750
751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800
801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850
851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900
901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950
951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000

1. Do you work in a DP/MIS dept.?
01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity. (Check one)

- 01. ☐ Manufacturer Computer Equip., Computers, Software
- 02. ☐ Manufacturer-Aerospace
- 03. ☐ Manufacturer-Other
- 04. ☐ Systems House
- 05. ☐ Computer Consultant
- 06. ☐ Computer Retailer/VAR/VAD Distributor
- 07. ☐ Communications
- 08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
- 09. ☐ Education
- 10. ☐ Government
- 11. ☐ Research and Development
- 12. ☐ Data Processing/Computer Service
- 13. ☐ Health/Medical/Legal Service
- 14. ☐ Engineering/Architecture

16. ☐ Agr./Const./Mining/Oil/Transp./Utilities

17. ☐ Non-Computer Retailer/Dist.

18. ☐ Other Business or Service

3. Please indicate your primary business function. (Check one)

- 01. ☐ DP/MIS
- 02. ☐ Systems, Programming
- 03. ☐ Communications
- 04. ☐ Engineering
- 05. ☐ Res./Dev./Scientific
- 06. ☐ Accounting/Finance
- 07. ☐ Computer Consulting
- 08. ☐ Purchasing
- 09. ☐ Operations
- 10. ☐ Production
- 11. ☐ Education/Training
- 12. ☐ Marketing/Sales
- 13. ☐ Medical/Legal
- 14. ☐ Admin./Mgmt.

5. For how many IBM PCs and compatibles do you specify brands of products:

01. ☐ 10 or less 03. ☐ 26-99

02. ☐ 11-25 04. ☐ 100 or more

6. Are there any PCs in your office?

- 01. ☐ Linked to mainframe
- 02. ☐ Linked to mini
- 03. ☐ Networked together

7. Please check the equipment currently installed at your location. (Check all that apply.)

- 01. ☐ IBM or Compatible PCs
- 02. ☐ IBM or Compatible Mainframes
- 03. ☐ IBM or Compatible Minis
- 04. ☐ Macintosh
- 05. ☐ CD-ROM
- 06. ☐ Windows

8. Do you plan to buy any PC products?

- 01. ☐ Now 03. ☐ In 7 to 12 months
- 02. ☐ In 4 to 6 months 04. ☐ No definite plans

Name

Title

Company Name

Address

City

Telephone

State

Zip

☐ Please send me a one-year (22-issue) subscription to PC Magazine for \$29.97 (U.S. price); all other countries add \$36.00 for additional postage.

In a Hurry? Fax This Card To: 609-829-0692



READER SERVICE CARD FREE INFORMATION

IT'S AS EASY AS 1,2,3

1. Fill in your name and address and check off your answers to the nine research questions.

2. Circle the numbers on the card that correspond to the ads or articles you'd like more information about.

3. The literature will be mailed to you from the advertiser free of charge.

CIRCLE FOR FREE INFORMATION

Void after September 30, 1994

001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021	022	023	024	025	026	027	028	029	030	031	032	033	034	035	036	037	038	039	040	041	042	043	044	045	046	047	048	049	050
051	052	053	054	055	056	057	058	059	060	061	062	063	064	065	066	067	068	069	070	071	072	073	074	075	076	077	078	079	080	081	082	083	084	085	086	087	088	089	090	091	092	093	094	095	096	097	098	099	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350
351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450
451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500
501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550
551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600
601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650
651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700
701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750
751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800
801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850
851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900
901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950
951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000

1. Do you work in a DP/MIS dept?
01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity: (Check one)

01. ☐ Manufacturer Computer Equip., Computers, Software
02. ☐ Manufacturer-Aerospace
03. ☐ Manufacturer-Other
04. ☐ Systems House
05. ☐ Computer Consultant
06. ☐ Computer Retailer/VAR/VAD Distributor
07. ☐ Communications
08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
09. ☐ Education
10. ☐ Government
11. ☐ Research and Development
12. ☐ Data Processing/Computer Service
13. ☐ Health/Medical/Legal Service
14. ☐ Engineering/Architecture

16. ☐ Agr./Const./Mining/Oil/Transp./Utilities17. ☐ Non-Computer Retailer/Dist.
18. ☐ Other Business or Service

3. Please indicate your primary business function: (Check one)

01. ☐ DP/MIS
02. ☐ Systems, Programming
03. ☐ Communications
04. ☐ Engineering
05. ☐ Res./Dev./Scientific
06. ☐ Accounting/Finance
07. ☐ Computer Consulting
08. ☐ Purchasing
09. ☐ Operations
10. ☐ Production
11. ☐ Education/Training
12. ☐ Marketing/Sales
13. ☐ Medical/Legal
14. ☐ Admin./Mgmt.

4. Is your company a reseller?
01. ☐ Yes 02. ☐ No

5. For how many IBM PCs and compatibles do you specify brands of products:

01. ☐ 10 or less 03. ☐ 26-99
02. ☐ 11-25 04. ☐ 100 or more

6. Are there any PCs in your office?

01. ☐ Linked to mainframe
02. ☐ Linked to mini
03. ☐ Networked together

7. Please check the equipment currently installed at your location: (Check all that apply)

01. ☐ IBM or Compatible PCs
02. ☐ IBM or Compatible Mainframes
03. ☐ IBM or Compatible Minis
04. ☐ Macintosh
05. ☐ CD-ROM
06. ☐ Windows

8. Do you plan to buy any PC products?

01. ☐ Now 03. ☐ In 7 to 12 months
02. ☐ In 4 to 6 months 04. ☐ No definite plans

9. Number of employees in your entire company:

01. ☐ 25 or less 03. ☐ 100-499 05. ☐ 1000
02. ☐ 26-99 04. ☐ 500-999

Name

PC 5/17-5

Title

Telephone

Company Name

Address

City

State

Zip

☐ Please send me a one-year (22-issue) subscription to PC Magazine for \$29.97 (U.S. price); all other countries add \$36.00 for additional postage.

In a Hurry? Fax This Card To 609-829-0692

FOR QUICKER RESPONSE

FAX TO

(800) 829-0692

Free Product Information

BUSINESS REPLY MAIL

FIRST CLASS MAIL

PERMIT NO. 433

RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

P.O. Box 1687
RIVERTON, NJ 08077-9687NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

COMPUTER DISCOUNT WAREHOUSE



ANOTHER FACT

ABOUT COMPUTER DISCOUNT WAREHOUSE™

WHY PAY RETAIL? CDW SELLS SOFTWARE FOR LESS!

FACT: CDW® welcomes volume bids from businesses, governments, and schools — and closes more than 30%

BENEFIT: You can obtain significant savings on large purchases by calling CDW Corporate Sales: 800-280-4239.

ADOBE ILLUSTRATOR V4.0 WIN
ADOBE PHOTOSHOP V2.5.1 WIN
ALDUS Pagemaker V5.0 WIN
ARE 5 FONTWORKSHOP WIN
ARTISOFT LANTASITIC AI V5.0 DOS
ARTISOFT LANTASITIC AI V5.0 WIN
ARTISOFT LANTASITIC SOFTWARE
ATI MEDIA MERGE V1.0
AUTODESK AUTOSKETCH WIN



**MICROSOFT
EXCEL V5.0
for Windows
Version Upgrade
ONLY
\$89.47
33553**

BERKELEY AFTER DARK WIN
BERKELEY DISNEY SCHN SWR WIN
BITSTREAM FIDELITY FOR WP V2.0
BORLAND C++ V4.0
BORLAND DBASE IV V2.0 DOS
BORLAND DBASE IV V2.0 DOS UPG
BORLAND OFFICE V2.0 WIN
BORLAND OFFICE V2.0 WIN COMP UPG
BORLAND PARADOX V4.5 DOS
BORLAND PARADOX V4.5 DOS UPG
BORLAND PARADOX V4.5 WIN
BORLAND TURBO C++ V3.0
BORLAND TURBO C++ VISUAL ED WIN
BORLAND TURBO PASCAL V7.0 DOS
BRODERBUND AUTOMAP WIN
BRODERBUND PrintShop DLX V1.2 WIN
CA CLIPPER V2.5 COMP UPG
CALERE OMNIPAGE PRO V5.0 WIN
CALERA WORDSCAN PLUS V2.0b WIN
CC MAIL 10 USER PACK
CEN POINT BACKUP V2.0 WIN
CEN POINT PC TOOLS V2.0 WIN
CEN POINT PC TOOLS V3.0 WIN
CLARIS FILEMAKER PRO WIN V2.1
CLARIS WORKS WIN
COMPTON'S BOOK OF LISTS CD
COREL DRAW 3.0 TO 4.0 UPG
COREL DRAW V3.0 WITH CD
COREL DRAW V4.0 WITH CD
COREL SCRI V2.0
DCA EASY INSTANT HOLODEX WIN
DCA CROSSTALK V2.1 WIN
DELOME MAP EXPERT WIN
DELIRIA COMM SUITE WIN
DELIRIA WIN FAX PRO NETWORK
DELIRIA WIN FAX PRO V3.0
DENEB CANVAS V1.0 WIN
DIEMBA CANVAS V1.0 WIN UPG
DIOSOFI QA PLUS V3.0 WIN
ECLIPSE FAX WITH OCR WIN
GENERIC CAD V6.1 DOS
HAYES SMARTCOM WIN
HELIUM NETROOM 1 USER
IBM DOS V6.1 UPG
IBM OS/2 for Windows V2.1
IBM OS/2 V2.1
IBM OS/2 V2.1 UPG
INSET SYSTEMS HAAK PRO V2.0
INSIGNIA ACCESS PC V3.0
INTEL FAXABILITY PLUS OCR V2.0
INTUIT QUICKBOOK QUICKPAY V2.0

INTUIT QUICKBOOKS V2.0 WIN
INTUIT QUICKEN DELUXE WIN CD-ROM
INTUIT QUICKEN V3.0 WIN
INTUIT QUICKEN V7.0 DOS
KODAK PHOTO CD ACCESS WIN
LASERTECH S PRINT CACHE
LOTUS 1-2-3 V4.01 MULTIMEDIA ED
LOTUS 1-2-3 V4.01 MULTIMEDIA ED UPG
LOTUS 1-2-3 V4.01 Organizer UPG WIN
LOTUS 1-2-3 V4.01 Organizer WIN
LOTUS 123 2.4 UPG KIT
LOTUS 123 V2
LOTUS 123 V2 4 NODE
LOTUS 123 V3 4A SERVER
LOTUS 123 V4.01 WIN
LOTUS 123 V4.01 WIN LIC
LOTUS 123 V4.01 WIN UPG
LOTUS AMI PRO SUPERBUNDLE
LOTUS AMI PRO V3.01 WIN
LOTUS AMI PRO V3.01 WIN VERS UPG
LOTUS APPROACH V2.1 WIN
LOTUS FREELANCE V2.01 WIN
LOTUS FREELANCE V2.01 WIN UPG
LOTUS IMPROV V2.1 WIN
LOTUS NOTES V3.0 STARTER PK
LOTUS ORGAMIZER V1.1 WIN
LOTUS SMARTSUITE V2.1 WIN
LOTUS SMARTSUITE V2.1 WIN UPG
LOTUS V3.0A UPG
LUCASARTS REBEL ASSAULT
MACROMEDIA ACTION V2.5 WIN



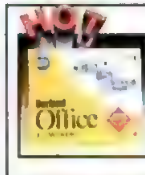
**MICROSOFT
WINDOWS
V3.11
Version Upgrade
ONLY
\$48.97
38149**

MATHSOFT MATHCAD V5.0 WIN
MEDIA VISION CRITICAL PATH CD
MEDIA VISION PLANET Adrenaline CD
MICROCOM CARBON COPY PLUS V6.1
MICROCOM CARBON COPY WIN
MICROGRAFX ABC FLOWCHRT WIN
MICROGRAFX DRAW V1.0 WIN
MOON VALLEY ICON HEAR IT
MOON VALLEY ROMATERIAL CD
MS ACCESS DIST KIT
MS ACCESS V1.1 WIN
MS ACCESS V1.1 WIN COMP UPG
MS ACCESS V1.1 WIN LIC
MS ACCESS V1.1 WIN VERS UPG
MS ARCADE WIN
MS BOOKSHELF CD
MS CINEMANIA 1994 CD
MS CREATIVE WRITER WIN
MS DINOSEARCH CD
MS ENCAPTA 1994 CD
MS EXCEL V5.0 WIN
MS EXCEL V5.0 WIN COMP UPG
MS EXCEL V5.0 WIN VERS UPG
MS FLIGHT SIMULATOR V5.0 DOS
MS FORTRAN V5.0
MS FOXPRO V2.5 DOS
MS FOXPRO V2.5 DOS COMP UPG
MS FOXPRO V2.5 DOS DIST KIT
MS FOXPRO V2.5 WIN
MS FOXPRO V2.5 WIN COMP UPG
MS FOXPRO V2.5 WIN DIST KIT



**WordPerfect
V6.0
for Windows
Version Upgrade
ONLY
\$98.13
31968**

MS FOXPRO V2.5 WIN DIST KIT UPG
MS FOXPRO V2.5 WIN UPG
MS GOLF WIN
MS MULTIMEDIA BEETHOVEN CD
MS MULTIMEDIA GOLF WIN CD
MS MUSICAL INSTRUMENTS CD
MS OFFICE PRO V4.0 WIN
MS OFFICE V4.0 WIN
MS OFFICE V4.0 WIN COMP UPG
MS OFFICE V4.0 WIN VER UPG
MS POWERPOINT V4.0 WIN
MS POWERPOINT V4.0 WIN COMP UPG
MS PROFIT V1.0 WIN
MS PROJECT V3.0 WIN
MS PROJECT V3.0 WIN COMP UPG
MS PROJECT V3.0 WIN VERS UPG
MS PUBLISHER V2.0 WIN
MS WINDOWS NT V3.1 UPG
MS VISUAL BASIC PRO V3.0 WIN
MS VISUAL BASIC V3.0 WIN
MS VISUAL BASIC V3.0 WIN UPG
MS VISUAL C++ V1.0 WIN
MS VISUAL C++ WINDOWS NT
MS WINDOWS NT V3.1
MS WINDOWS NT V3.1 ADV SRV
MS WINDOWS NT V3.1 ADV SRV UPG
MS WINDOWS NT V3.1 UPG
MS WINDOWS PRINTING SYS
MS WINDOWS SMD SYS V2.0 SW
MS WINDOWS V3.11
MS WINDOWS V3.11 LIC
MS WINDOWS V3.11 UPG
MS WORD V6.0 DOS
MS WORD V6.0 DOS VERS UPG
MS WORD V6.0 WIN
MS WORD V6.0 WIN COMP UPG
MS WORD V6.0 WIN VERS UPG
MS WORKS V3.0 DOS



**BORLAND
OFFICE
V2.0
for Windows
Version Upgrade
ONLY
\$225.86
34899**

MS WORKS V3.0 WIN
MS WORKGROUP ADD ON V3.11
MS DOS V8.2 STEP UP
MS DOS V8.2 UPG
MS DOS V8.2 UPG 3 PACK
NORTON CLOSE UP HOST & REMOTE
NORTON DESKTOP V3.0 WIN
NORTON UTILITIES V7.0

PACIFIC MICRO MAC IN DOS
PEACHTREE ACCT V2.0 WIN
PROCCOM PLUS V2.01 DOS
PRICER
QUALITAS 386 MAX V7.0
QUARKXPRESS V3.12 WIN
QUARTERDECK DESQVIEW 386 V2.6
QUARTERDECK QEMM V7.0 UPG
QUARTERDECK QEMM V7.01
QUARTERDECK QEMM V7.01 + GAMES
QUATTRO PRO V5.0 DOS
QUATTRO PRO V5.0 WIN
SABER LAN WRKSTN V1.0
SABER LAN WRKSTN V2.0 NODE
SHAPEWARE VISIO V2.0 WIN
SOLID OAK DISK HISTORIAN WIN
SPC Harvard Graphics V2.0 WIN
SPC Harvard Graphics V2.0 WIN UPG
SPC Harvard Graphics V3.06 DOS
Sprocket Calendar Creator V2.0 WIN
Sprocket FORMWORK V2.0 WIN
STACKER V3.1 SPECIAL DOS V8.0
STACKER V3.1 WINDOW DOS
SWIFTE LETTERHEAD FOR WORD
WIN MORTON BACKUP V3.0 WIN
SYM NORTON PC ANYWHERE V4.5 DOS
SYM Norton Utilities V8.0 DOS-WIN
Symantec ACT! V2.0 WIN
SYMANTEC ACT! V2.100S
SYMANTEC ANTI VIRUS V3.0
SYMANTEC DIRECT ACCESS V1.0 WIN
SYMANTEC DIRECT ACCESS V5.1 DOS
SYMANTEC PC ANYWHERE V1.0 WIN
SYMANTEC PC ANYWHERE V4.5
SYMANTEC PC ANYWHERE V4.5 REMOTE



**LOTUS 1-2-3
V4.01 for
Windows
Version Upgrade
ONLY
\$97.09
32690**

SYMANTEC Q&A 4.0 DOS
SYMANTEC Q&A V4.0 COMP UPG WIN
SYMANTEC Q&A V4.0 WIN
SYMANTEC SAFE V2.1 DOS-WIN
THE UNINSTALLER V2.0 WIN
TOUCHSTONE CHECK IT PRO SET
Traveling Software LAPLINK V
Traveling SW Commworks V1.0 WIN
Traveling SW Commworks WIN SPC UPG
VIRGIN 7TH GUEST CD
WALL DATA RUMBA AS-400
WordPerfect Grammarly V5.1 Win
WORDPERFECT V8.0 DOS
WORDPERFECT V8.0 DOS COMP UPG
WORDPERFECT V8.0 DOS LICENSE
WORDPERFECT V8.0 DOS UPG
WORDPERFECT V8.0 WIN
WORDPERFECT V8.0 WIN COMP UPG
WORDPERFECT V8.0 WIN LICENSE
WORDPERFECT V8.0 WIN UPG
WordPerfect Works
WP InfoGeneral V1.0 Win
WP Presentations V2.0 WIN + SCANMAN
WP V8.0 WQUATTRO PRO
WP V8.0 WIN WQUATTRO COMP UPG
WP V8.0 WIN WQUATTRO VER UPG
Win! Win! Win! Win! Win! Win! Win!
XTREE GOLD V3.0 DOS

COMPUTER DISCOUNT WAREHOUSE

WE SELL NAME BRAND ITEMS FOR LESS!

(800)-326-4CDW

FAX

(708) 465-6800

NASDAQ

CDW® is a NASDAQ traded company

TRADING SYMBOL: CDW

D & B RATED 4A1 Dune 10-762-7952



PCM919

©1994 CDW Computer Centers, Inc.

Turn the Page
For More
CDW Savings

No Surcharge For Credit Cards



High Volume Bids Invited



COMPUTER DISCOUNT WAREHOUSE™

MAGNAVOX

Magnavox 20CM64 20" SuperVGA Monitor

- ✓ Max Resolution: 1280x1024 Non-Interlaced
- ✓ Max Refresh: 90Hz, .31mm Dot Pitch
- ✓ Supports Wide Variety of Video Standards
- ✓ Front Mounted Controls, Tilt/Swivel Base
- ✓ 1 Year Warranty



**Special
Low
Price**

20CM64.....\$999.00 CDW 20751

WHY PAY RETAIL?

**CDW® Sells
For Less**

Canon

BJ-200e

- ✓ 360 dpi BubbleJet Printer
- ✓ Up to 33% Faster than BJ-200

ONLY \$289.00 CDW 34907

BJC-600

- ✓ 360 dpi Color BubbleJet Printer
- ✓ Optimized for Plain Paper
- ✓ Laser-quality Text Output

ONLY \$578.25 CDW 32009

NEW!

**CDW
TOP SELLER**

HARDWARE, SOFTWARE & PERIPHERALS AT DISCOUNT PRICES

NETWORKING PRODUCTS

NOVELL

Netware V4.01

5 USER CD	848.00
10 USER CD	1895.00
25 USER CD	2845.00
50 USER CD	3748.00

Netware V3.12

5 USER 3.5"	578.00
10 USER 3.5"	1298.00
25 USER 3.5"	1898.00
50 USER 3.5"	2578.00
100 USER 3.5"	3698.00

Call for Pricing on Netware CD ROM Versions and upgrades

PERSONAL NETWORK V1.0 NEW

1 USER	67.57
5 USER	265.52

NOVELL PRICING IS SUBJECT TO CHANGE. PLEASE CALL CDW FOR THE MOST CURRENT PRICING.



COACTIVE STARTER KIT	189.99
COACTIVE ADD-ON KIT	139.89



TC5143 ETHERNET COAX	
TC5143 ETHERNET COAX 6PK	
TC5143 ETHERNET 10BT	
TC5143 ETHERNET 10BT 6PK	
TC6242 ARCNET 8 BIT COAX CARD	
TC6245 ARCNET COAX CARD	
TC6245 ARCNET+ TP CARD	
TC6245 ARCNET ALL-IN-ONE CARD	
TC6040 ARCNET PASSIVE 4 PORT HUB COAX	
TC6055 ETHERNET 8 PORT CON 10BT	
TC4045 TOKEN RING 16/4 CARD	



NODERUNNER 2000A	217.34
NODERUNNER 2000T	174.47
NODERUNNER 2000C	172.47
NODERUNNER/SI 2000A	105.88
NODERUNNER/SI 2000T	86.44
NODERUNNER/SI 2000C	86.44
Lantastic V6.0	79.50
Lantastic V6.0 5 user	322.90
Lantastic V6.0 Starter Kit	334.31
CENTRAL STATION II	389.89
10BT 5 PORT INTERNAL HUB	255.33
NODERUNNER STARTER KIT WINDOWS	479.29
SIMPLY LANTASTIC START KIT NEW	204.03
SIMPLY LANTASTIC V1.0 NEW	54.89
T-RUNNER 8 PORT 10BT	299.88
T-RUNNER 12 PORT 10BT	488.41



ULTRA16 ETHERNET COAX	105.25
ULTRA16 COAX 6PK	579.05
ULTRA16 COAX 24PK	2206.98
ULTRA16 ETHERNET 10BT	105.25
ULTRA16 10BT 6PK	578.54
ULTRA16 10BT 24PK	2115.36
ULTRA16 ETHERNET COMBO	119.35
ULTRA16 COMBO 6PK	669.38
ULTRA16 COMBO 24PK	2566.88
ETHERCARD+ ELITE COAX	119.64
ETHERCARD+ ELITE COAX 6PK	628.73
ETHERCARD+ ELITE MCA COAX	189.26
ETHERCARD+ ELITE 10BT	119.64
ETHERCARD+ ELITE 10BT 6PK	619.22
ETHERCARD+ ELITE MCA 10BT	189.55
ETHERCARD+ ELITE EISA 10BT	579.78
ETHERCARD+ ELITE COMBO	139.57
ETHERCARD+ ELITE COMBO 6PK	753.59
3608 ETHERNET 8 PORT CON 10BT	329.51
3512 ETHERNET 12+2 PORT CON 10BT	614.76
PC600WS ARCNET CARD COAX	119.93
PC600WS ARCNET CARD TP	119.88
PC600FS ARCNET CARD COAX	199.29
PC130 ARCNET CARD COAX	68.50
ARCNET 8 PORT ACTIVE HUB COAX	229.41
TOKENCARD ELITE 16/4	265.88

NETWORKING PRODUCTS

3Com

3C503 ETHERLINK II COAX	159.44
3C509 ETHERLINK III COAX	115.50
3C509 ETHERLINK III COAX 5 PK	529.12
3C509 ETHERLINK III 10BT	115.50
3C509 ETHERLINK III 10BT 5 PK	527.97
3C509 ETHERLINK III COMBO	135.88
3C509 ETHERLINK III COMBO 5 PK	578.84
3C579 ETHERLINK EISA COAX	229.91
3C579 ETHERLINK EISA 10BT	229.91
3C1827 12 PORT LINKBUILDER 10BT	638.95

OTHER TOP-QUALITY NAME BRANDS

EAGLE NE2000+ COAX	109.90
EAGLE NE2000+ 10BT	94.80
EAGLE NE3200 THIN COAX w/TPA	478.34
NATIONAL SEMI NE2000+ COAX	89.54
NATIONAL SEMI NE2000+ 10BT	84.59

If You Don't See What You Are Looking For, Call CDW. We Carry the Best Networking Selection in the Industry!



PE310BC POCKET ETHERNET COAX	308.89
PE310B2 POCKET ETHERNET COAX	224.44
PE310BT POCKET ETHERNET 10BT	268.31
PA202B6 POCKET ARCNET COAX	229.30
POCKET TOKEN RING II	455.89
PPX03 PARALLEL PORT MULTIPLEXOR	77.80
XIRCOM 14 4K POCKET MODEM	506.19

IBM TOKEN RING

IBM TOKEN RING 16/4 ISA	429.68
IBM TOKEN RING 16/4 MCA	489.56
IBM TOKEN RING MAU	458.88



ETHEREXPRESS 16 COAX	99.33
ETHEREXPRESS 16 COAX 5PK	454.13
ETHEREXPRESS 16 COAX 20PK	1698.38
ETHEREXPRESS MCA COAX	166.52
ETHEREXPRESS 16 10BT	99.33
ETHEREXPRESS 16 10BT 5 PK	454.13
ETHEREXPRESS 16 10BT 20PK	1698.38
ETHEREXPRESS MCA 10BT	166.52
ETHEREXPRESS 16 COMBO	116.77
ETHEREXPRESS 16 COMBO 5PK	545.09
ETHEREXPRESS 16 COMBO 20PK	2036.93
ETHEREXPRESS FLASH 10BT	111.88
ETHEREXPRESS FLASH 10BT 5PK	515.62
ETHEREXPRESS FLASH COMBO	129.79
ETHEREXPRESS FLASH COMBO 5 PK	599.00
ETHEREXPRESS EISA COAX	409.88
TOKENEXPRESS 16/4	349.04
NETPORT II COAX	368.85
NETPORT II 10BT	368.85
ETHEREXPRESS ISA HUB	519.93
ETHEREXPRESS ISA HUB EXP	449.96

TAPE, REMOVABLE & FLOPPY DRIVES



JUMBO 120MB INTERNAL	99.80
JUMBO 250MB INTERNAL	167.34
TRAKKER 120MB PARALLEL PORT	199.45
TRAKKER 250MB PARALLEL PORT	324.84
POWERTAPE 2 4GB SCSI INTERNAL	546.91
POWERTAPE 2 4GB SCSI EXTERNAL	1087.99
POWERDAPE 4GB SCSI INTERNAL	1188.00



TAPE 250MB INTERNAL	169.57
TAPE 250 INTERNAL PLUS	185.13
FLOPTICAL 21MB INSIDER	379.27
BERNOULLI 90MB PC POWERED PRO	298.49
BERNOULLI 150MB INSIDER SCSI	479.11
BERNOULLI 150MB INSIDER IDE	469.59
BERNOULLI 150MB PC POWERED	494.78
BERNOULLI 150MB TRANSPORTABLE	568.26
90MB CARTRIDGE	89.27
150MB CARTRIDGE	92.80

MICROSOLUTIONS

BACKPACK 3.5" 1.44MB FLOPPY PARALLEL	174.32
BACKPACK 5.25" 1.2MB FLOPPY PARALLEL	175.89
BACKPACK 170MB HD PARALLEL	308.59
BACKPACK 200MB HD PARALLEL	399.00
BACKPACK 2X CD-ROM PARALLEL	377.44
BACKPACK 250MB TAPE BU PARALLEL	365.05

TAPE, REMOVABLE & FLOPPY DRIVES

SyDOS

PRO NOTE 42MB PARALLEL	418.17
PUMA 88MB PARALLEL	442.44
PUMA 105MB PARALLEL	519.80
MARLIN 105MB INT IDE	478.26
88MB EXT SCSI W/ADPT	538.00



TD-250 250MB INT IDE	189.32
FS8500 305MB INT IDE	449.50
SIDECAR II 305MB PARALLEL TBU	358.77
1200-4 4GB EXT SCSI	2045.39
750MB-1 5GB INT TBU W/ADPT	1036.19
750MB-1 5GB EXT TBU W/ADPT	1254.69

WYSE TERMINALS

WYSE 30 AMBER OR GREEN	272.89
WYSE 50 AMBER OR GREEN	355.50
WYSE 55 AMBER, GREEN, WHITE	231.86
WYSE 60 AMBER, GREEN, WHITE	279.60
WYSE 150 AMBER, GREEN, WHITE	265.45
WYSE 180 AMBER, GREEN, WHITE	329.88
WYSE 325 COLOR	458.40

MULTIMEDIA, SOUND, CD

ALTEC LANSING ACS300 SPKRS/SW	274.26
Beethoven Int MM Explorer Kit w/ 16 bit sound	332.08
Beethoven Int MM Intro Kit w/ 16 bit sound	186.74
CDW 4 CD EDUTAINMENT BUNDLE*	85.16
CDW 5 CD BUNDLE*	129.17
CDW 5 CD BUSINESS BUNDLE*	119.88
CDW 5 CD ENTERTAINMENT BUNDLE*	79.33
CREATIVE LABS DigitalEdge MM Kit	627.17
CREATIVE LABS DISCOVERY 16 INT	328.88
CREATIVE LABS SB 16 AWE32	295.04
CREATIVE LABS SB 16 SCSI	177.90
CREATIVE SB 16 ASP MCD	183.79
DIAMOND SONIC SOUND BASIC	214.58
DIAMOND SONIC SOUND LX	109.30
MEDIA VISION CRITICAL PATH	44.63
MEDIA VISION MEMPHIS SYS	578.75
MEDIA VISION PRO AUDIO 16 BASIC	97.74
MEDIA VISION PRO AUDIO SPECT 16	123.84
MEDIA VISION PRO AUDIO STUDIO 16	157.45
MICROSOFT BOOKSHELF CD	119.89
MICROSOFT CINEMANIA 1994	52.88
MICROSOFT WIN SND SYS V2.0	52.95
MS ENCARTA 1994	85.24
MS MULTIMEDIA BEETHOVEN	52.88
MS WIN SND SYS V2.0 W/BOARD	139.20
ORCHID GAMEWAVE 32	138.40
ORCHID SOUNDWAVE 32	219.72
PROCOM EXT MULTIMEDIA STATION	789.46
PROCOM INT MULTIMEDIA STATION	739.18
SONIC SOUND PRO UPG KIT	98.45
SONY DSKTOP LIB EXT W/SND 2X	479.54
SONY DSKTOP LIB INT W/SND 2X	467.73
SONY DSKTOP LIBRARY INT 2X	234.10
SOUND BLASTER PRO DLX	79.00
TURTLE BEACH MONTEREY SND CRD	349.77
TURTLE BEACH MULTISOUND	427.88

*AVAILABLE ONLY WITH CD-ROM DRIVE PURCHASE. CALL FOR DETAILS.

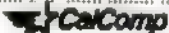
CD-ROM & OPTICAL DRIVES

Beethoven 260ms Int CD-ROM Kit	178.73
CHINON CD5535 INT CD-ROM KIT	367.60
CHINON CD535 EXT CD-ROM KIT	427.88
NEC 3X2 EXTERNAL	558.92
NEC 3X1 INTERNAL	479.90
NEC 3Xp Portable	427.59
ORCHID CD53110 INT	194.88
PIONEER DR604X 6 DISC Quadraspin	1149.00
PLEXTOR 3028 240MS INT KIT	CALL
PLEXTOR 3028 W/PA SPECTRUM 18	CALL
PLEXTOR 5028 240MS EXT KIT	CALL
PLEXTOR 5028 W/PA SPECTRUM 18	CALL
SONY CDU-33A Int 2X CD-ROM Kit	179.78
SONY CDU535 INT CD-ROM	274.72
SONY CDU561 INT SCSI 2X CD-ROM	289.83
SONY CDU7205N EXT CD-ROM	449.88
SYDOS PARALLEL PORT CD-ROM	289.49
Toshiba 3401 EXT SCSI 4 DRIVE TOWER	2535.08
Toshiba 3401 EXT SCSI CD-ROM	468.80
Toshiba 3401 EXT SCSI CD-ROM W/ADPT	599.95
Toshiba 3401 INT SCSI CD-ROM	367.60
Toshiba 3401 INT SCSI CD-ROM W/ADPT	519.55

PLOTTERS, DIGITIZERS & SCANNERS

HURTA

IS/ONE 12 X 12 4 BUTTON	295.25
IS/ONE 12 X 12 12 BUTTON	298.82
XLP 12 X 12 4 BUTTON & STYLUS	219.55
XLP 12 X 12 16 BUTTON	442.60
XGT 12 X 12	343.98



DB III 12X12 4 BUTTON	299.37
DB III 12X12 16 BUTTON	299.37
DB III 12X18 W/PRES PEN	399.85
DB III 12X18 16 BUTTON CORDLESS	696.85
SLATE 12X12 W/PRES PEN	363.40
SLATE 12X12 W/16 BUTTON	239.91

Canon

IX4015 COLOR SCANNER	997.42
----------------------	--------

Summagraphics

SUMMASKETCH III 12 X 12 16 BUTTON	253.90
SUMMASKETCH III 18 X 12 4 BUTTON	524.44



HI 7100 A-D SIZE 8 PEN	2598.78
HI 7200 A-F SIZE 8 PEN	3387.22



HP SCANJET IIP	734.61
HP SCANJET IIP DOCUMENT FEEDER	269.93
HP SCANJET IICX W/ISA	995.50
HP SCANJET IICX DOCUMENT FEEDER	474.72
IICX TRANSPARENCY ADAPT	633.26

EPSON

ACTIONSANNER ES800C	796.86
ACTIONSANNER ES800C	1065.00
ACTIONSANNER ES800C PRO	1238.53

VIDEO PRODUCTS

VGA & SUPER VGA MONITORS

AST VISION 4N 14"	369.91
MAG INNOVISION MX15F	497.15
MAG INNOVISION DX15F	435.90
MAG INNOVISION MX17F	877.40
MAG INNOVISION MX17FG	927.53
MAG INNOVISION DX17F	698.00
MAGNAVOX CM2099 14" 28	257.88
MAGNAVOX CM2099 14" 28 NM	278.80
MAGNAVOX CM4017 17"	648.20
MAGNAVOX 20CM64 20" SPECIAL	999.00
NANAO F340W 15"	659.00
NANAO F5501 17"	999.00
NANAO F5501W 17"	1127.00
NEC 3V 15"	478.79
NEC 3FGE 15"	577.17
NEC 4FGE 15"	529.81
NEC 5FGE 17"	998.50
NEC 5FGE 17"	1129.20
NEC 6FGE 21"	1999.00
PANASONIC C13811 14"	335.76
PHILIPS 1764DC 17"	119.50
PHILIPS BRILLIANCE 17"	995.00
PHILIPS BRILLIANCE 21"	2239.45
SONY CPD1430 14"	497.00
SONY CPD1730 17"	997.00
SONY 17SE 17"	1147.00
SONY GDM2038 20"	2198.00

VGA & SUPER VGA DISPLAY CARDS

ADS VGA TO TV ELITE	224.57
ATI Graphics Ultra 2MB	237.58
ATI Graphics Ultra Pro 2MB	257.66
ATI Graphics Ultra Pro 2MB EISA	294.92
ATI Graphics Ultra Pro 2MB VLB	257.59
CARDINAL WARPSPEED 2MB VLB	479.20
CREATIVE LABS VIDEO BLASTER	339.02
CREATIVE LABS VIDEO SPIGOT	237.73
DIAMOND STEALTH PRO 1MB	247.47
DIAMOND STEALTH PRO 2MB	333.32
DIAMOND SPEEDSTAR PRO 1MB	107.43
DIAMOND VIPER VLB 2MB	387.86
HERCULES GRAPHITE PRO 1MB	255.46
HERCULES GRAPHITE 2MB	268.45
HERCULES DYNAMITE VLB	157.30
INTEL SMART VIDEO RECORDER	488.88
ORCHID FAHRENHEIT 1280+	157.84
ORCHID FAHRENHEIT VA	172.97
ORCHID CELSIUS VLB 1MB	238.97
ORCHID CELSIUS VLB 2MB	297.96

COMPUTER DISCOUNT WAREHOUSE



Hayes



PRICE REDUCTION!

Check out our new, lower prices on ACCURA 96/14.4K and OPTIMA PCMCIA modems!

ACCURA 14.4+FAX ... **\$156.80** CDW 27349

WHY SETTLE FOR LESS?

CDW® SERVICES YOU BETTER



WinWriter 600 Laser Printer

The first optimized, fully integrated Microsoft® At Work based printer that utilizes the underlying technology of the Microsoft Windows® Printing System.

- ✓ 800 dpi, 8 ppm/300 dpi, 10 ppm
- ✓ 2MB RAM Std., 8MB Max.
- ✓ Motorola 68000 CPU, 16.7MHz
- ✓ Emulation: PCL 4, Microsoft Windows Printing System
- ✓ Bi-directional Parallel Interface
- ✓ 44 TrueType fonts
- ✓ 200 sheet paper capacity
- ✓ Energy Star compliant
- ✓ Requires host PC running Windows 3.1 or higher

\$197.38 CDW 36332

CDW CARRIES OVER 15,000 PRODUCTS. IF YOU DON'T SEE IT, CALL!

COMPUTERS

TOSHIBA

T1910 120MB	1477.94	T1950CT 200MB	2199.99
T1910CS 120MB	2067.56	T1950CT 320MB	2499.99
T1910CS 200MB	2277.70	T1950CT 320MB	2499.99
T1950 120MB	1677.70	T3300CT 120MB	1499.99
T1950 200MB	2057.80	T4600 120MB	1499.99
T1950S 120MB	1667.56	T4600 200MB	1799.99
T1950S 200MB	1967.56	T4600C 200MB	1799.99
T1950CT 120MB	1477.94	T4600C 340MB	1999.99
T4700CS 200MB DUAL CLR	2499.99		
T4700CT 320MB ACT CLR	2499.99		
T4700CT 320MB ACT CLR	2499.99		
T4800CT 500MB ACT CLR	2999.99		
T6600C 510MB ACT CLR	2999.99		
T6600C 510MB CO ACT CLR	2999.99		

AST BRAVO SERIES

LC 4255 120MB	989.75	LP 4255 340MB	1594.95
LC 4335 120MB	1059.00	LP 4330 170MB	1415.64
LC 4330 120MB	1159.84	LP 4330 340MB	1899.77
LC 4330 210MB	1467.97	P 4680 170MB	1299.99
LC 4500 120MB	1448.21	LP 4680 340MB	1999.99
LC 4500 210MB	1697.56	MT 4330 170MB	1299.99
LC 4680 120MB	1728.34	MT 4330 340MB	1599.99
LC 4680 210MB	1959.80	MT 4680 170MB	1599.99
LC 4680 340MB	1999.99	MT 4680 340MB	1999.99

Canon

NOTEJET 425 180MB	2547.82
NOTEJET 425 120MB COLOR	2799.58
NOTEJET 425 200MB COLOR	3089.57
INNOVA 425L SX 170MB	529.64
INNOVA 425L SX 240MB	1025.71
INNOVA 450L 170MB	1349.55
INNOVA 450L 240MB	1428.96
INNOVA 468L 170MB	1538.57
INNOVA 468L 240MB	1614.88

EPSON

ActionNote 48LC50 120MB-modem	1656.82
ActionNote 48LC50 180MB-modem	1739.96
ActionNote 500C 120MB-modem	1879.75
ActionNote 500C 180MB-modem	2063.91

IBM

ThinkPad 500 4500X2 85 MB	1599.00
ThinkPad 500 4500X2 170MB	1899.00

PNValueNet Systems

4255X 120MB	1177.41	4530 MT 120MB	1164.99
4255X 210MB	1477.41	4600X2 MT 210MB	1499.99
4330X 120MB	1277.41	4600X2 MT 420MB	1799.99
4330X 210MB	1577.41	4600X2 MT 340MB	1799.99
4680X 120MB	1777.41	4600X2 MT 520MB	2199.99
4680X 210MB	1977.41	Perkin 560 520MB	3799.00
4330 MT 210MB	1177.41		

NEC

VERSA NOTEBOOKS

440 120MB Mono	2564.43	450 200MB Color	4487.44
440 120MB Color	3817.30	450 340MB Mono	3659.76
440 200MB Mono	2969.87	450 340MB Color	4817.38
440 200MB Color	4226.81	475 340MB Color	5229.05
450 200MB Mono	3254.00		
READY 4255 170MB Multimedia	1436.70		
READY 4335 210MB Multimedia	1798.71		
IMAGE III 450 210MB	1719.00		
IMAGE III 450 210MB	1978.62		
POWERMATE 4255X 170MB	1129.54		
POWERMATE 4600X2 210MB	1388.27		
POWERMATE 4600X2 210MB	1727.72		

PACKARD BELL

Diplomat 425 170MB mono	1199.99
Statesman 4 500X2 200MB color	1499.99
Force Multimedia 4 25 210MB	1199.99
Force Multimedia 4 35X 140MB	1199.99
Force Multimedia 4 40X2 420MB	1199.99
Force Multimedia 4 460X2 420MB	1199.99
Force Multimedia 4 50 420MB	1199.99
Force 4 50X2 340MB	1199.99
Force 4 460X2 420MB	1199.99
Force MT 4 460X2 420MB	1199.99

TEXAS INSTRUMENTS

TM4000 5KX25 336 MONO	1199.99
TM4000 DX 25 200MB MONO	1199.99
TM4000E SX 25 12MB ADV. COLOR	1199.99
TM4000E DX 40 25 140MB P&S COLOR	1199.99
TM4000E DX 25 200MB MONO	1199.99
TM4000E DX 25 200MB DUAL COLOR	1199.99
TM4000E 150 200MB P&S COLOR	1199.99
TM4000E DX 75 340MB COLOR	1199.99
TM4000E DX 475 455MB COLOR	1199.99

COMPUTERS

SHARP NOTEBOOKS

486/33 200MB PAS CLR W/TRKBALL	2629.37
486/33 200MB ACT CLR W/TRKBALL	2967.75

DOT MATRIX & LASER PRINTERS

OKIDATA

184 TURBO	219.14	ML501	585.87
ML320	304.45	PaceMaker 3410	1222.92
ML321	432.43	OL 402E	499.98
ML380	214.95	OL 410E	649.31
ML395	189.32	OL 810	805.50
ML395C	1039.74	OL850	1079.11
ML520	369.82	OL850 PS	1199.20
ML521	499.18	DOC-IT 4000	2909.49
ML580	429.51		

Canon

BJ108X	249.80	BJC600 Color	578.28
BJC80E NEW	289.00	BJC600 Laser	598.50
BJC90	289.00	600DPI 6PPM NEW	1377.51

EPSON

AP2250	115.63	LO870	444.91
AP3250	171.95	LO1170	609.93
AP3250	197.00	LO2550	898.08
FX810	267.59	DFX800	1319.84
FX1170	354.95	STYLUS 300	228.80
LO570	237.97	STYLUS 800	251.97
LO1070	365.35		
ACTION LASER 1500	656.70		
ACTION LASER 1500 W/2MB	715.22		

IBM LEXMARK LASER PRINTERS

4037 5E 5PPM	1157.17
4037 10 10PPM	1115.42
4037 10R 10PPM	1339.46
4037 10RD 10PPM Duplex	1839.77
4037 12R 12PPM	1689.76
4037 12L 12PPM	2154.24
4037 18L 18PPM	2735.38
WinWriter 800 NEW	1197.28

NEC

P3600	219.00	Smartwriter 95F	867.70
SuperScript 810	587.78	Smartwriter 1067	1377.00
Smartwriter 640	788.58		

Parascan

1150	133.49	2024	409.49
1624	365.20	3123 NEW	249.00
2024	702.87	4410 LASER	547.15
2123	243.37	4430 LASER	686.91
2124	318.41	4440 LASER	1019.76

TEXAS INSTRUMENTS

MICROMARK INKJET	248.00
MICROWRITER BASIC	517.16
MICROWRITER P525	777.22
MICROWRITER P565	937.20
MICROLASER PRO 800 P525	1308.90
MICROLASER PRO 800 P565	1828.26
POWERSTEP UPG-ML500	274.68

SHARP PRINTERS

SHARP JX3400 3000PI 4PPM	477.08
SHARP JX3400PS 6000PI 6PPM	949.88

HEWLETT PACKARD

Design Portable 310	387.40	LaserJet 4MP	999.92
Design 550	298.80	LaserJet 4	1299.99
Design 550	298.80	LaserJet 4	1299.99
Design 1200C	1449.61	LaserJet 4M	1999.94
Design 1200C PS	2256.47	LaserJet 4M	1999.94
Design 1200C	2256.47	LaserJet 4M	1999.94
LaserJet 4L	889.97		

COSTAR

LabelWriter II DOS/Win	178.00
Address Express	329.00

HARD DRIVES & CONTROLLERS

Maxtor

131MB IDE	199.10	345MB IDE	298.80
170MB IDE	205.48	345MB SCSI	365.83
245MB IDE	265.48	504MB IDE	426.30
245MB SCSI	365.83		

MICROPOLIS

100MB IDE	294.48	160GB SCSI AV	899.35
100MB SCSI	428.40	1.75GB SCSI AV	1389.38
1.7GB SCSI	1129.85	3GB SCSI	2098.00

HARD DRIVES & CONTROLLERS

CONNER

210MB IDE	219.39	CP3244 540MB IDE	539.84
345MB IDE	288.07	CP3244 540MB SCSI	811.15
345MB SCSI	339.59	CP3244 1GB SCSI	808.04
426MB IDE	355.25		

WESTERN DIGITAL

210MB IDE	221.89	426MB IDE	304.80
345MB IDE	228.24	426MB SCSI	448.70
426MB IDE	298.64		

Seagate

130MB IDE	184.54	535MB SCSI-2	649.44
200MB IDE	214.74	1.0GB SCSI-2	897.20
281MB IDE	237.80	1.0GB SCSI	899.24
341MB IDE	293.71	1.6GB SCSI-2	1596.31
452MB IDE	384.25		

CONTROLLERS

ACCULOGIC IDE W/1PAR, 2SER, 1GAME	35.06
ACCULOGIC IDE W/BIOS	48.90
ACCULOGIC VLB IDE	98.76
ADAPTEC 1510A SCSI-2 CD KIT	89.86
ADAPTEC 1542CF SCSI-2	265.45
ADAPTEC 2742T EISA SCSI-2	339.22
ADAPTEC 2942 VLB SCSI-2	349.45
Promise IDE VLB Cache	99.88
Promise IDE VLB Cache	143.35

MODEMS & COMMUNICATIONS

Robotics

14.4 INT	139.50	14.4 EXT W/FAX	169.50
14.4 INT W/FAX	169.50	Workport 14.4	149.00
14.4 EXT	159.50		

COURIER MODEMS

V32Tebint	330.00	V32TebEXT	378.00
V32Tebint W/FAX	384.54	V32TebEXT W/FAX	380.00
DUAL STD TERBO INT W/FAX	709.13		
DUAL STD TERBO EXT W/FAX	732.63		

Hayes

ACCURA 2400B INT	59.10
ACCURA 2400B EXT	69.25
ACCURA 2400C FAX 96 INT	89.49
ACCURA 96 FAX 96 INT	139.96
ACCURA 96 FAX 96 EXT	147.90
ACCURA 14.4 FAX 14.4 INT	148.20
ACCURA 14.4 FAX 14.4 EXT	156.80
OPTIMA 2400 V 42BIS EXT	112.64
OPTIMA 24.4 FAX 96 EXT	119.34
OPTIMA 9600 EXT	338.50
OPTIMA 96 FAX 96 EXT	354.42
OPTIMA 14.4 EXT	363.80
OPTIMA 14.4 FAX 14.4 EXT	374.30
OPTIMA 28.8 V F/C W/FAX EXT	439.13
ULTRA 9600 EXT	569.18
ULTRA 14.4 EXT	645.20
ESP Accelerated Single/Dual Serial	79.50/121.12

Robotics

2400B INT	59.60
2400B EXT	69.95
2400C FAX 96 INT	76.95
PM2400F 2400 INT W/FAX	107.40
PM2400F 2400 EXT W/FAX	139.77
PM9600F 9600 INT W/FAX	199.99
PM9600F 9600 EXT W/FAX	199.99
PM14400F 14.4 INT W/FAX	159.50
PM14400F 14.4 EXT W/FAX	179.58
PM14400F 14.4 EXT W/FAX LCD	374.43
PM14400F 14.4 POCKET W/FAX	287.50

Robotics

100 INT	98.65	400 INT	273.05
200 INT	209.50	400 EXT	309.59

FAX MODEMS

2400 V 42BIS INT	99.00	9600 EXT W/FAX	169.80
2400 V 42BIS EXT	113.72	14.4 INT W/FAX	194.15
9600 INT W/FAX	133.76	14.4 EXT W/FAX	174.28

BOCA

BOCA 14.4K INT W/FAX	117.22
----------------------	--------



COMPUTER DISCOUNT WAREHOUSE

WHY PAY RETAIL? CDW® Sells For Less!

OKIDATA

OL410e LED Page Printer

- ◆ HP PCL5 Emulation ◆ 4ppm W/RISC Processor ◆ Energy Star Certified
- ◆ 600 DPI Class Output (300 X 1200 DPI) ◆ 2MB W/Enhanced Memory
- ◆ Expandable to 5MB RAM ◆ Serial & Parallel Interfaces W/Auto Switching
- ◆ 100 Sheet Paper Tray ◆ 12 Scalable Fonts

CDW® Price **\$649.31** CDW 34379

XL VALUE!



OL400e/OL410e

OL400e LED Page Printer

The Perfect Personal Printer for Your Office

- ◆ 4 PPM ◆ 300 DPI ◆ 32 Bit RISC Chip ◆ 512 KB RAM Standard
- Expandable to 4.5 MB ◆ HP PCL4 Emulation ◆ Serial and Parallel Interfaces with Auto-Switching
- ◆ 100 Sheet Paper Tray ◆ 44 Bitmap Fonts ◆ Industry's Best Warranty: 5 Years on Printhead, 1 Year Parts/Labor on Printer ◆ Energy Star Certified

CDW® Price **\$499.98** CDW 30968

CDW TOP SELLER



LED Page Printers	PPM	DPI	RAM	Max RAM	OKI Smoothing Technology	FONTS	Postscript	Interface	Emulation	Price	CDW
OL810	8	300	1MB	5MB	Yes	13 Scale, 42 Bit	No	Parallel	PCL 5	\$905.50	23104
OL830	8	300	2MB	4MB	Yes	17 PS, 26 Bit	Yes	Parallel	PCL 4	\$1,079.11	27207
OL850	8	300	2MB	4MB	Yes	65 PS, 26 Bit	Yes	S/P/APPLE	PCL 4	\$1,199.20	27208

OKIDATA®



ML 590/ 591



ML 395/ 395C



ML 520/ 521

Dot Matrix Printers	Pins	CPS HS Draft	CPS Draft/Utility	CPS NLQ	CPS LQ	Color	Buffer	Interface	Emulation	Width	Price	CDW
ML320	9		300	63		No	28/16K	Parallel	A,B	Narrow	\$304.45	15676
ML321	9		300	63		No	28/16K	Parallel	A,B	Wide	\$432.43	10515
ML520	9	430	320	80		No	64K	Parallel	A,B,C	Narrow	\$369.82	27668
ML521	9	430	320	80		No	64K	Parallel	A,B,C	Wide	\$499.18	27670
ML590	24	450	360		120	Opt	32/64K	Parallel	D,E	Narrow	\$429.51	24899
ML591	24	450	360		120	Opt	32/64K	Parallel	D,E	Wide	\$585.87	24900
ML380	24		240		63	No	8K	Parallel	D	Narrow	\$214.95	15526
ML395	24	607	486	242	162	No	64K	Par/Ser	E,F	Wide	\$989.32	29571
ML395C	24	607	486	242	162	Std	64K	Par/Ser	E,F	Wide	\$1,039.74	29572
Pacemark 3410	9	550	417	104		No	64K	Par/Ser*	G,H	Wide	\$1,222.92	21815

*Optional 3rd Party Twinax or Coax Available

A=Epson FX B=IBM PP C=Microline D=Epson LQ E=IBM XL24E F=Epson LQ 2550 G=IBM Proprinter III H=Epson FX 1050

If You Find a Better Price, Call CDW Before You Buy!

CDW® Sells for Less and Services You Better!

(800) 339-4CDW

PCM919

©1994 CDW® Computer Centers, Inc.

PC Magazine - 9/17/94

FREE TECHNICAL SUPPORT FOR CDW® CUSTOMERS (800) 383-4239

COMPUTER DISCOUNT WAREHOUSE

COMPUTER DISCOUNT WAREHOUSE™

WHY PAY RETAIL? CDW® Sells For Less!



**TEXAS
INSTRUMENTS**

NEW
Intel
i486DX4/75
POWER!

Texas Instruments TM4000E WinDX4/75

**Another first from Texas Instruments:
The World's First i486DX4/75 Mhz
Notebook.**

The TM4000E WinDX4/75 is the world's fastest notebook, based on Intel's latest clock-tripled i486 technology. Blazing 75Mhz speed, brilliant active matrix color displays and high capacity IDE hard drives outperform most desktop computers! With a 35-45% performance advantage over TI's top-rated i486DX2/50 notebooks, the WinDX4/75 is the ultimate combination of performance and portability.

- ✓ Preinstalled MS-DOS V6.2, Windows V3.1 and TI Utilities
- ✓ Desktop-feel 4MM Full Travel Keyboard
- ✓ 4MB RAM Std., 20MB Max.
- ✓ Ballpoint Mouse V2.0
- ✓ Parallel, Serial, External Keyboard and Video Ports
- ✓ 6.2 lbs, 3 Hour Battery Life

8.4" Active Matrix Color, 340MB Hard Drive... **\$4559.86** 38864

9.4" Active Matrix Color, 455MB Hard Drive... **\$5079.10** 38865

TM4000E WinSX/25 Monochrome Notebook

- ◆ i486SX/25 CPU
- ◆ 4MB RAM Std., 20MB Max
- ◆ 120MB IDE Hard Drive
- ◆ Parallel, Serial, External Keyboard and Video Ports
- ◆ 10" Monochrome LCD, 64 Gray Scales
- ◆ Simultaneous External Video Support
- ◆ Pre-installed MS-DOS V6.2, Windows V3.1, TI Utilities
- ◆ BallPoint Mouse V2.0 with QuickPort

WinSX/25 Monochrome **\$1697.57** CDW 32070



**TRUE
DRO!**

TM4000E WinDX2/50 Monochrome Notebook

- ◆ i486DX2/50 CPU, Integrated MPU
- ◆ 4MB RAM Std., 20MB Max.
- ◆ 200MB IDE Hard Drive
- ◆ Parallel, Serial, External Keyboard and Video Ports
- ◆ 10" Monochrome LCD, 64 Gray Scales
- ◆ Simultaneous External Video Support
- ◆ Pre-installed MS-DOS V6.2, Windows V3.1, TI Utilities
- ◆ BallPoint Mouse V2.0 with QuickPort

WinDX2/50 Monochrome **\$2427.06** CDW 32678



**TRUE
DRO!**

TM4000E WinDX2/50 Dual Scan Color Notebook

- ◆ i486DX2/50 CPU, Integrated MPU
- ◆ 4MB RAM Std., 20MB Max.
- ◆ 200MB IDE Hard Drive
- ◆ Parallel, Serial, External Keyboard and Video Ports
- ◆ 9.4" Dual Scan-STN Color Display
- ◆ Simultaneous External Video Support
- ◆ Pre-installed MS-DOS V6.2, Windows V3.1, TI Utilities
- ◆ BallPoint Mouse V2.0 with QuickPort

WinDX2/50 Color **\$2997.00** CDW 32679



**TRUE
DRO!**



Texas Instruments

TI microLaser Pro 600: 600DPI

- ◆ 8 PPM Engine Speed ◆ Adobe Postscript Level 2 (23 or 65 Fonts)
- ◆ 600 x 600 DPI Resolution in PostScript Mode ◆ 300 x 300 DPI in PCL5 Mode ◆ Adobe IntelliSelect Automatic Language Switching
- ◆ Bi-Directional Parallel and AppleTalk Interfaces Standard
- ◆ SCSI and RS-232 Serial Interfaces Optional ◆ 6MB RAM Standard, Expandable to 22 MB ◆ Two 250 Sheet Input Trays Standard: Letter and Envelope Ready
- ◆ 1 Year Parts and Labor Warranty



microLaser Pro PS23 PostScript (23 Fonts)..... **\$1308.00*** CDW 32069

microLaser Pro PS65 PostScript (65 Fonts)..... **\$1528.25** CDW 32068

*After \$60.00 Manufacturer Rebate (through 6/30/94)

TI microWriter

- ◆ 300 DPI, LED Print Engine ◆ 5 PPM
- ◆ 16 Mhz 68000 Controller with TI Proprietary ASICs ◆ Small Footprint - 13.8" x 10.4" ◆ 512K Standard, Upgradable to 4 MB
- ◆ Standard 250 Sheet Input Tray with Face Down and Face Up Output ◆ Front Control Panel
- ◆ Optional Multimedia Feeder and Second Paper Feeder



microWriter Basic **\$517.16** CDW 27064

microWriter PS23 Postscript (23 Fonts), 2MB **\$677.22** CDW 27065

TI microMarc

- ◆ Professional Quality Printing ◆ Reliable Performance
- ◆ Fast Print Speed ◆ Drop On Demand Thermal Inkjet (128 Nozzles) ◆ 300CPS ◆ 300 DPI ◆ PCL3 ◆ 24K Buffer
- ◆ 3 Fonts, Autosheet Feeder (100 Sheets)

microMarc **\$248.00*** CDW 29698

*After \$30.00 Manufacturer Rebate (through 6/30/94)

COMPUTER DISCOUNT WAREHOUSE™

**If You Find a Better
Price, Call CDW®
Before You Buy!**

CDW® Sells for Less and Services You Better!

(800) 339-4CDW

PCM919

©1994 CDW® Computer Centers, Inc.

NEW!
**Lease Option
Call for Details**



Advertising Sales Staff

One Park Avenue,
New York, NY 10016
212 503-5100

DISPLAY ADVERTISING

Dan Rosensweig -
Associate Publisher
(212) 503-5354
Anna Zornosa - Associate
Publisher/West Coast
(415) 378-5505
Lon Otremba -
East Coast
Advertising Director
(212) 503-4453
Bill Stephen
National Sales Manager
(212) 503-5626
Ad Coordination Supervisor
Christine Holsten
(212) 503-5264
Advertising Coordinator
Julie Eigo
(212) 503-5107

NETWORK EDITION

Kimberly White - Eastern
Advertising Manager/
Network Products - Eastern
Region & Midwest
(617) 393-3056
Account Representative
Allyson Deane
(212) 503-5044
Paul Klein - Western
Advertising Manager/
Network Products - Western
Region & Southwest
(415) 378-5546
Account Representative
Andrew Zeiger
(212) 503-5162

MA, NH, VT, ME, RI, Canada

District Sales Manager
Michael Bird (617) 393-3058
10 President's Landing, Mystic Center
Medford, MA 02155
(617) 393-3055
Account Representative
Kirk McDonald
(212) 503-5970

CT, NY, NJ, PA, OH

District Sales Manager
Michael Hatherill (212) 503-5128
One Park Avenue, 4th Floor
New York, NY 10016
(212) 503-5100
District Sales Manager
Lisa Friedman
(212) 503-5149
Account Representative
Elizabeth Cusick
(212) 503-5112
Account Representative
Wendy Nathan
(212) 503-5024

DE, MD, DC, VA, WV, NC, SC, AL, MS, TN, AR, KY, GA, FL

District Sales Manager
Frank Quigley (404) 814-8950
3405 Piedmont Road NE, Suite 460
Atlanta, GA 30305
(404) 814-8940
Account Representative
(212) 503-5032

NE, WI, IL, IN, KS, MN, MO, MI, IA, ND, SD

District Sales Manager
Ken Beach (312) 214-7330
150 North Wacker Drive, 25th Floor
Chicago, IL 60606
(312) 214-7300
Sr. Account Representative
Beth Boyle
(212) 503-5047

TX, OK, LA, NM

District Sales Manager
Todd Anderman (214) 360-5725
5956 Sherry Lane, Suite 625
Dallas, TX 75225
(214) 360-5700
Sr. Account Representative
Stephanie Brzozowski
(212) 503-5675

Mark Malloy - Southwest
Area Manager
(310) 268-1331

CA (San Diego & Orange County), AZ, HI, CA (Los Angeles)

District Sales Manager
Robin Kofsky (714) 852-5920
18301 Von Karman Avenue, Suite 330
Irvine, CA 92715
(714) 852-5914
Account Representative
Alysa Parisi
(212) 503-5113
Elizabeth O'Connor
(212) 503-5040

CA (San Jose), ID

Senior District Sales Manager
Michael Klein (415) 378-5521
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5500

Account Representative
Keven Parades
(212) 503-5663

Mike Kisseberth - Northwest
Area Manager
(415) 378-5510

CA (San Francisco & North), OR, WA, NV

District Sales Manager
Ira Becker (415) 378-5523
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5500

Account Representative
Jeff Green
(212) 503-5129

CA (South San Francisco to Mountainview), CO, UT, WY, AK, MT

District Sales Manager
Kristy Newton (415) 378-6859
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5500

Account Representative
Tim Castelli
(212) 503-5125

CENTRAL ADVERTISING

VP, Central Advertising
Robert A. Bader
Director of Sales & Marketing
Paul Fusco

Sales Manager
Monte Wasch

Production Director
Vicki Egan

Sr. Production Coordinator
Nadine Messier

Sr. Production Coordinator
Berhan Asmarom

Advertising Coordinator
Audie Marie Tinoso

AL, AR, FL, GA, LA, MS, NC, SC, TN, TX,
WV, KY

Account Manager
Leslie Eddy
(212) 503-5171

AK, AZ, CA (209, 213, 310, 619, 714, 805,
818, 909), NM, OK, HI

Account Representative
Carolyn Goldfarb
(212) 503-5076

CT, IA, IL, IN, ME, MI, NH, NJ, RI, VT,
WI

Sr. Account Representative
Bill Herbst
(212) 503-5193

CA (209, 408, 410, 415, 707, 916)

Account Representative
R.J. Kirkland
(212) 503-5118

DC, NY, PA, DE, MD, OH, MO, VA, CN,
Foreign

Account Representative
James Meyer
(212) 503-5150

CO, ID, KS, MN, MT, ND, NE, NV, OR, SD,
UT, WA, WY

Account Representative
Maggie Hewit
(212) 503-5156

Business Card
Advertising
Call: 1-800-825-4237
PC Magazine Marketplace
3rd Floor, One Park Ave.
New York, NY 10016

For more information
regarding central
advertising please call:
212 508-5115
1-800-825-4237

For more information
regarding display
advertising please call:
212 503-5100
1-800-33MAG AD

Advertisers' Index COMPANIES

Reader Service No.	Advertiser	Page
376	3 Com Corporation	16-17
910	3M Data Storage Products	53
034	Acer America	81-85
226	ADI Systems Inc	45
368	Adobe Systems Inc	180-181
*	AMBRA COMPUTER CORPORATION	108-114
165	Amdek	366
915	American Power Conversion	NE7
025	American Small Business Computers	365
235	AMS	343
336	Arlington Computer Products	325-327
903	Arnet	NE5
*	AST Research	20-21
*	AT&T Global Information Solutions	317-320
228	ATI Technologies Inc	179
012	Austin Computer Systems	266-267
*	Autodesk Inc	72
129	Avery Dennison	228
318	Aztech Labs, Inc	157
342	Bell Atlantic	18
285	Borland International	6
220	Borland International	51
015	Bulldog Computer Products	342
173	Cadillac Motor Car Division	149
097	Caere Corporation	64-65
341	Calera Recognition System	158
*	Canon Computer Systems	98
868	Chayenne Software	NE37
073	Colorado Memory Systems	57
*	Communication Intelligence	36
*	Compaq Computer Corporation	118-119
137	Compaq Computer Corporation	278-279
126	CompuAdd	217
359	CompuAdd	219
144	CompUSA Direct	232-233
274	CompuServe	337-339
300	Computability	306-307
348	Computer Associates	5
159	COMPUTER DISCOUNT WAREHOUSE	402, 405
109	COMPUTER DISCOUNT WAREHOUSE	406-407
360	COMPUTER DISCOUNT WAREHOUSE	408-409
158	Computer Library	401
316	Comtrade	358-359
948	Conner Peripherals	NE34
322	Corel Corporation	13
011	Corel Corporation	163
086	Creative Labs	63
355	Curtram Investments Inc	213
389	DCA	23
*	DEE ONE SYSTEMS	313
*	Dell Computer Corporation	C5-C8
*	Dell Computer Corporation	300-301
250	Delrina Technology	55
854	DIGIBOARD	NE33
*	Digital Equipment Corporation	171-174
931	Digital Equipment Corporation	NE16-NE17
347	DUSTIN DISCOUNT SOFTWARE	304
362	Eastman Kodak Company	160-161

Reader Service No.	Advertiser	Page
197	EPS Technologies, Inc	332
*	Epson America	10-11
305	ExpoTech/VTech	328-331
*	Fidelity Investments	43
014	First Source International	334-335
103	Frame Technology	193
852	Frye Computer Systems	NE10
870	Funk Software	NE22
*	Gateway 2000	121-131
277	Global Horizons, Inc	333
391/138	H.Co Memory Upgrades	314
933	Hayes Microcomputer Products	260
*	Hewlett Packard Peripheral Group	74-75
116	Hewlett Packard Peripheral Group	134-135
*	Hewlett Packard	58-59
*	Hewlett Packard	NE12
*	IBM Corporation	24-25
*	IBM Corporation	151-154
*	IBM Corporation	190-191
*	IBM Corporation	237
052	Inmac	162
219	INSIGHT DIRECT/HARD DRIVES INT'L	344-347
*	Intel Corporation	223-226
*	Intel Corporation	243-250
242	Kanisha Computer Center	336
921	Kingston Technology	NE3-NE9
869	Kyocera	NE27
019	L.A. Trade	341
169	Landmark	78
100	Lexmark International	168-169
*	Lotus Development Corporation	70-71
*	Lotus Development Corporation	90-91
*	Lotus Development Corporation	205
263	Macola, Inc	277
067	Mag Innovision	282
365	Manugistics	265
124	Matrox, Inc	235
386	Maxtor Corporation	76-77
093	Media Vision	86
272	Media Vision	144
130	Media Vision	285
325	MediaMagic	207
018	MegaHaus	367
383	Memory Direct	368
855	Micro Solutions Computer Products	234
119	Micron Computer, Inc	102-106
*	Microsoft	2-3
*	Microsoft	96-97
*	Microsoft	142-143
*	Microsoft	253-255
883	MicroSystems Software Inc	NE44
091	Microtek	183
010	Midwest Computer Works	322-323
398	Midwest Micro	349-353
283	Nanao Corporation	136
157	NEC Technologies	C2-1
044	NEC Technologies	214-215
394	NEC Technologies	279

Reader Service No.	Advertiser	Page
*	Network Express	340
*	Northgate Computer Systems	201
*	Northgate Computer Systems	203
346	Norton Lambert	41
858	NOTIS Systems, Inc	273
905	Novell, Inc	221
950	Novell, Inc	NE2-NE3
881	Novell, Inc	NE15
056	Okidata	198-199
853	Olicom USA	NE29
147	Optquest	147
*	Pacific Data Products, Inc	275
301	Patton & Patton	206
*	PC Connection	308-310
080	PC Power & Cooling	89
092	PCs Compleat	360-361
268	PCs Compleat	362-363
867	Performance Technology	NE24
026	Personics	4
246	Phillips	159
866	Pinnacle Micro	311
148	Primavera Systems	60
929	Proton Inc	NE23
140	Proxima	69
375	Publishers Toolbox	364
314	Publishing Perfection	321
904	Quarterdeck Office Systems	NE11
865	Rosa Electronics	NE28
856	Saber Software	NE31
046	Samsung Information Systems	263
*	Sharp Electronics Corp	287
949	Silicom Connectivity Solutions	NE39
377	Sony Recording Media	NE25
909	Standard Microsystems Corporation	NE19-NE21
081	Sunshine Computers	348
117	Symantec Corporation	28
344	Symantec Corporation	208
175	Syquest Technology	141
353	Texas Instruments	94
304	Texas Instruments	187
379	Toshiba America	26-27
004	Touchstone Software	80
920	US Robotics Inc	101
051	USA Flex	354-355
210	USA Flex	356-357
343	Valueline	316
*	WordPerfect Corporation	14-15
*	WordPerfect Corporation	229
211	Xircom	268
036	Zeos Int'l	33
063	Zeos Int'l	34-35
155	Zeos Int'l	48A-48F
125	Zeos Int'l	49
038	Zeos Int'l	67
115	Zeos Int'l	92
927	Zykel USA	315

* No Reader Service #. Please Call Advertiser For Information.

Advertisers' Index PRODUCTS

Reader Service No.

Company

Product

Page

ACCELERATOR BOARDS			
124	Matrox, Inc.	Matrox MGA II	235
ACCOUNTING SOFTWARE			
346	Computer Associates	Simply Accounting	5
263	Macola, Inc.	Accounting Software	277
ADD-ON BOARDS			
318	Aztech Labs, Inc.	Pro 16 Multimedia Upgrade Kit	157
015	Bulldog Computer Products	Hardware/Peripherals	342
086	Creative Labs	Multimedia Upgrade Kit	63
014	First Source International	Memory	334-335
381/138	H.Co Memory Upgrades	Memory/PCMCIA	314
124	Matrox, Inc.	Matrox MGA II	235
272	Media Vision	Family Ad	144
130	Media Vision	Media Vision Sound Family	285
BACKUP SOFTWARE			
868	Cheyenne Software	ArcServe	NE37
855	Micro Solutions Computer Products	Tape Backup	234
CAD/CAM			
025	American Small Business Computers	Design CAD for Windows	365
*	Autodesk Inc.	AutoCAD LT	72
CD-ROM			
015	Bulldog Computer Products	Hardware/Peripherals	342
173	Cadillac Motor Car Division	Cadillac Diskette	149
300	Computability	Mail Order	306-307
158	Computer Library	Computer Select	401
322	Coral Corporation	Ventura	13
219	INSIGHT DIRECT/HARD DRIVES INT'L	CD-ROM	344-347
083	Media Vision	Rene	86
130	Media Vision	Media Vision Sound Family	285
855	Micro Solutions Computer Products	CDROM	234
157	NEC Technologies	CD-ROM	C2-1
314	Publishing Perfection	Software/Peripherals/Hardware	321
343	ValueLine	Mail Order/Peripherals	316
CHIPS/PROCESSORS			
381/138	H.Co Memory Upgrades	Memory/PCMCIA	314
019	LA Trade	Memory	341
COMMUNICATIONS SOFTWARE			
389	DCA	Crosstalk for Windows	23
250	Delima Technology	Win Fax Pro for Networks	55
*	Intel Corporation	ProShare	243-250
858	NOTIS Systems, Inc.	Graphical User Interface	273
COMPUTERS/COMPATIBLES			
034	Acer America	PCs and Notebooks	81-85
*	AMBRA COMPUTER CORPORATION	IVL Pentium Notebook SpecSheet	108-114
336	Arlington Computer Products	Mail Order Products	325-327
*	AST Research	Brave	20-21
*	AT&T Global Information Solutions	PCs/Notebooks	317-320
012	Austin Computer Systems	Austin Desktops	286-287
*	Compaq Computer Corporation	Notebooks and Desktops	118-119
137	Compaq Computer Corporation	Contura Aero	278-279
128	CompuAdd	CompuAdd Systems	217
350	CompuAdd	CompuAdd Systems	219
144	CompUSA Direct	Mail Order	232-233
158	COMPUTER DISCOUNT WAREHOUSE	Hardware	402, 405
108	COMPUTER DISCOUNT WAREHOUSE	Hardware	406-407
380	COMPUTER DISCOUNT WAREHOUSE	Hardware	408-409
316	Comrade	Systems Mail Order	358-359
*	DEE ONE SYSTEMS	Systems	313
*	Dell Computer Corporation	Dell Systems	C5-C8
*	Dell Computer Corporation	Dell Systems	300-301
*	Digital Equipment Corporation	Systems	171-174
197	EPS Technologies, Inc.	Systems	332
305	ExpoTech/VTech	486DX2/50 Mhz, 486SX/25 Mhz	328-331
*	Gateway 2000	PCs	121-131
277	Global Horizons, Inc.	Systems	333
*	Hewlett Packard	HP Vectra	58-59
*	IBM Corporation	Net Select	24-25
*	IBM Corporation	Valuepoint Systems	151-154
*	IBM Corporation	Thinkpad	190-191
052	Immac	Systems	162
219	INSIGHT DIRECT/HARD DRIVES INT'L	Mail Order Systems	344-347
010	Micron Computer, Inc.	Micron PC's	102-106
010	Midwest Computer Works	PCs	322-323
398	Midwest Micro	Desktop Systems	349-353
044	NEC Technologies	Image Series Desktops	214-215
*	Northgate Computer Systems	PCs	201
*	Northgate Computer Systems	PCs	203
082	PCs Complete	Mail Order	380-381
288	PCs Complete	Mail Order	382-383
051	USA Flex	Desktop PCs	354-355
310	USA Flex	Desktop PCs	356-357
343	ValueLine	Mail Order/Peripherals	316
083	Zeos Int'l	Freestyle/Contenda	34-35
155	Zeos Int'l	Zeos Upgradables	48A-48F
125	Zeos Int'l	Multimedia	49
038	Zeos Int'l	Ambra	67
115	Zeos Int'l	Pantera	92
DATA BASE MANAGERS			
285	Borland International	Paradox for Windows	6
*	Microsoft	Microsoft FoxPro 2.6	2-3
028	Personica	Monarch	4
DESK TOP PUBLISHING			
322	Coral Corporation	Ventura	13
103	Frame Technology	Framemaker 4.0	193
DIAGNOSTIC SOFTWARE			
852	Frye Computer Systems	Frye Utilities for Networks	NE10
188	Landmark	Diagnostic Software	78
DISK BACKUP & TAPE DRIVES			
910	3M Data Storage Products	3M Data Storage Products	53
308	Computability	Mail Order	306-307

Reader Service No.

Company

Product

Page

018	MegaHaus	Drives/Storage	367
855	Micro Solutions Computer Products	Tape Backup/Disk Drives	234
885	Sony Recording Media	Tape Backup	NE25
343	ValueLine	Mail Order/Peripherals	316
DISKETTES			
173	Cadillac Motor Car Division	Cadillac Diskette	149
377	Sony Recording Media	Tape Backup	NE25
DISPLAYS/MONITORS/TERMINALS			
228	ADI Systems Inc.	Monitors	45
185	Amdel	Monitors	388
015	Bulldog Computer Products	Hardware/Peripherals	342
*	DEE ONE SYSTEMS	Monitors	313
067	Mag Innovation	Monitors	282
010	Midwest Computer Works	Monitors	322-323
283	Nanaco Corporation	Monitors	136
147	Optquest	Monitors	147
246	Philips	Monitors	158
148	Proxima	Desktop Presentation Projector	88
048	Samsung Information Systems	Monitors	263
343	ValueLine	Mail Order/Peripherals	316
ELECTRONIC MAIL			
*	Lotus Development Corporation	CC Mail	70-71
*	Microsoft	PC Mail	253-255
ENTERTAINMENT SOFTWARE			
173	Cadillac Motor Car Division	Cadillac Diskette	149
274	CompuServe	On Line Services	337-338
FLOWCHARTING			
301	Patton & Patton	Flowcharting Software	208
GRAPHICS SOFTWARE			
087	Casra Corporation	Omni Page	64-65
011	Coral Corporation	Draw 3.0 & Draw 4.0	163
858	NOTIS Systems, Inc.	Graphical User Interface	273
375	Publishers Toolbox	Graphics Products	364
HARD DISKS			
300	Computability	Mail Order	306-307
*	DEE ONE SYSTEMS	Hard Drives	313
219	INSIGHT DIRECT/HARD DRIVES INT'L	Hard Drives	344-347
388	Mador Corporation	Hard Data	76-77
018	MegaHaus	Drives/Storage	367
855	Micro Solutions Computer Products	Disk Drives	234
HARDWARE			
854	DIGIBOARD	Internetworking Solutions	NE33
052	Immac	Systems	162
321	Kingston Technology	Networking Products	NE8-NE9
081	Microtek	Scanners	183
398	Midwest Micro	Notebooks/Desktops/Peripherals	349-353
853	Olicom USA	Token Ring Adapters	NE29
211	Xircom	Xircom Token Ring Adapter	288
INFORMATION MANAGERS			
355	Curtram Investments Inc.	Personal Information Manager	213
*	Lotus Development Corporation	Lotus Organizer	305
*	WordPerfect Corporation	WordPerfect - InfoCentral	229
INPUT DEVICES			
*	Communication Intelligence	Handwriter for Windows	38
INTEGRATED SOFTWARE			
852	Frye Computer Systems	Frye Utilities for Networks	NE10
*	Lotus Development Corporation	SmartSuite	80-81
*	Microsoft	Microsoft Office	142-143
858	Saber Software	Saber LAN Workstation	NE31
LAN ADAPTER BOARDS			
903	Arnet	Smartport/Multiport	NE5
854	DIGIBOARD	Multiport Serial Boards	NE33
321	Kingston Technology	Networking Products	NE8-NE9
*	Network Express	Network Mail Order	348
948	Silicom Connectivity Solutions	NICs and PCMCIA NICs	NE38
908	Standard Microsystems Corporation	Ethernet	NE19-NE21
LOCAL AREA NETWORKING			
378	3 Com Corporation	Etherlink PCMCIA Card	18-17
903	Arnet	Smartport/Multiport	NE5
858	Cheyenne Software	ArcServe	NE37
300	Computability	Mail Order	306-307
158	COMPUTER DISCOUNT WAREHOUSE	Networking Products	402, 405
108	COMPUTER DISCOUNT WAREHOUSE	Networking Products	406-407
380	COMPUTER DISCOUNT WAREHOUSE	Networking Products	408-409
852	Frye Computer Systems	Frye Utilities for Networks	NE10
*	Hewlett Packard	EtherTwist Hubs	NE12
*	IBM Corporation	Net Select	24-25
863	MicroSystems Software Inc.	CALANDAR	NE44
*	Network Express	Network Mail Order	348
950	Novell, Inc.	OracleWare	NE2-NE3
881	Novell, Inc.	Personal NetWare	NE15
867	Performance Technology	POWERLAN	NE24
929	Proton Inc.	Network Interface Cards	NE23
865	Rose Electronics	Video Switch & ServeView	NE28
858	Saber Software	Saber LAN Workstation	NE31
*	Standard Microsystems Corporation	Ethernet	NE19-NE21
211	Xircom	Xircom Token Ring Adapter	288
MAIL ORDER			
004	Acer America	PCs and Notebooks	81-85
*	AMBRA COMPUTER CORPORATION	IVL Pentium Notebook SpecSheet	108-114
228	AMS	Notebooks	343
336	Arlington Computer Products	Mail Order Products	325-327
012	Austin Computer Systems	Austin Notebooks & Desktops	286-287
015	Bulldog Computer Products	Mail Order	342
*	Compaq Computer Corporation	Notebooks and Desktops	118-119
128	CompuAdd	CompuAdd Systems	217
358	CompuAdd	CompuAdd Systems	219

Advertisers' Index PRODUCTS

Reader Service

No.	Company	Product	Page
144	CompUSA Direct	Mail Order	232-233
159	COMPUTER DISCOUNT WAREHOUSE	Hardware/Peripherals/Reseller	402-405
109	COMPUTER DISCOUNT WAREHOUSE	Hardware/Peripherals/Resellers	406-407
380	COMPUTER DISCOUNT WAREHOUSE	Hardware/Peripherals/Resellers	408-409
318	Contrade	Systems Mail Order	358-359
347	DUSTIN DISCOUNT SOFTWARE	Mail Order	304
197	EPS Technologies, Inc.	Systems	332
306	ExpoTech/VTech	486DX/50 Mhz, 486SX/25 Mhz	328-331
014	First Source International	Memory	334-335
*	Gateway 2000	Mail Order	121-131
277	Global Horizons, Inc.	Systems/Software/Peripherals	333
381/138	H.Co Memory Upgrades	Memory/PCMCIA/Fax/Modems/LAN	314
*	IBM Corporation	Valuepoint Systems	151-154
*	IBM Corporation	Thinkpad	190-191
052	Innec	Systems	162
242	Kanisha Computer Center	Mail Order	336
130	Media Vision	Media Vision Sound Family	285
018	MegaHaus	Drives/Storage	367
383	Memory Direct	Memory	368
010	Midwest Computer Works	Mail Order	322-323
*	Network Express	Network Mail Order	340
*	Northgate Computer Systems	PCs/Notebooks	201
*	Northgate Computer Systems	PCs/Notebooks	203
082	PC Connection	Mail Order	308-310
258	PCs Complete	Mail Order	360-361
375	PCs Complete	Mail Order	362-363
314	Publishers Toolbox	Mail Order	364
343	Publishing Perfection	Software/Peripherals/Hardware	321
038	Valueline	Mail Order	318
063	Zeos Int'l	Zeos Colornote	33
063	Zeos Int'l	Freestyle/Contenda	34-35
155	Zeos Int'l	Zeos Upgradables	48A-48F
125	Zeos Int'l	Multimedia	49
038	Zeos Int'l	Ambra	67
115	Zeos Int'l	Pantera	92

MASS STORAGE

073	Colorado Memory Systems	Mass Storage	57
300	Computability	Mail Order	306-307
948	Conner Peripherals	End User	NE34
175	Syquest Technology	3 1/2" Removable Cartridge	141

MEMORY

014	First Source International	Memory	334-335
381/138	H.Co Memory Upgrades	Memory	314
018	L.A. Trade	Memory	341
383	Memory Direct	Memory	368

MICRO-MAINFRAME LINKS

903	Amet	Smartport/Multiport	NE5
-----	------	---------------------	-----

MISCELLANEOUS

342	Bell Atlantic	AirBridge	18
274	CompuServe	On Line Services	337-338
853	Olivcom USA	Token Ring Adapters	NE28
140	Proxima	Desktop Presentation Projector	89

MODEMS

300	Computability	Mail Order	306-307
933	Hayes Microcomputer Products	Optima	280
920	US Robotics Inc.	PCMCIA Modems	101
211	Xircom	Xircom Token Ring Adapter	258
927	Zykel USA	Modems	315

MULTI-MEDIA

318	Aztech Labs, Inc.	Pro 16 Multimedia Upgrade Kit	157
173	Cadillac Motor Car Division	Cadillac Diskette	149
086	Creative Labs	Multimedia Upgrade Kit	63
219	INSIGHT DIRECT/HARD DRIVES INT'L	Multimedia	344-347
272	Media Vision	Family Ad	144
130	Media Vision	Media Vision Sound Family	285
325	MediaMagic	Audio Boards & Sound Systems	207
125	Zeos Int'l	Multimedia	49

OCR PRODUCTS

087	Caera Corporation	Omni Page	64-65
341	Calera Recognition System	WorkScan Plus	158

ON LINE DATABASE

274	CompuServe	On Line Services	337-338
*	Fidelity Investments	Fidelity On-Line Express	43
858	NOTIS Systems, Inc.	Graphical User Interface	273

OPERATING SYSTEMS/ENVIRONMENTS

905	Novell, Inc.	Novell DOS 7.0	221
-----	--------------	----------------	-----

OPTICAL PERIPHERALS

886	Pinnacle Micro	Optical Drives	311
-----	----------------	----------------	-----

ORGANIZATIONS/SERVICES

274	CompuServe	On Line Services	337-338
*	Intel Corporation	Intel Verified Labs	223-226

PC ACCESSORIES

855	Micro Solutions Computer Products	Tape Backup/CDROM/Disk Drives	234
140	Proxima	Desktop Presentation Projector	89

PC DIRECT

165	Amdel	Monitors	366
025	American Small Business Computers	Design CAD for Windows	365
235	AMS	Notebooks	343
336	Arlington Computer Products	Mail Order Products	325-327
*	AT&T Global Information Solutions	PCs/Notebooks	317-320
015	Bulldog Computer Products	Hardware/Peripherals/Mail Order	342
300	Computability	Mail Order	306-307
159	COMPUTER DISCOUNT WAREHOUSE	Hardware/Peripherals/Reseller	402-405
109	COMPUTER DISCOUNT WAREHOUSE	Hardware/Peripherals/Resellers	406-407
380	COMPUTER DISCOUNT WAREHOUSE	Hardware/Peripherals/Resellers	408-409
316	Contrade	Systems Mail Order	358-359
*	DEE ONE SYSTEMS	PCs/Monitors/Peripherals	313
197	EPS Technologies, Inc.	Systems	332

Reader Service

No.	Company	Product	Page
305	ExpoTech/VTech	486DX/50 Mhz, 486SX/25 Mhz	328-331
277	Global Horizons, Inc.	Systems/Software/Peripherals	333
219	INSIGHT DIRECT/HARD DRIVES INT'L	Mail Order	344-347
242	Kanisha Computer Center	Mail Order	336
019	L.A. Trade	Memory	341
018	MegaHaus	Drives/Storage	367
383	Memory Direct	Memory	368
010	Midwest Computer Works	Hardware/PCs/Monitors	322-323
398	Midwest Micro	Notebooks/Desktops/Peripherals	349-353
*	Network Express	Network Mail Order	340
*	PC Connection	Mail Order	308-310
082	PCs Complete	Mail Order	360-361
258	PCs Complete	Mail Order	362-363
086	Pinnacle Micro	Optical Drives	311
375	Publishers Toolbox	Mail Order Products	364
314	Publishing Perfection	Hardware/Peripherals/Hardware	321
081	Sunshine Computers	Mail Order	348
051	USA Flex	Mail Order	354-355
210	USA Flex	Mail Order	356-357
343	Valueline	Mail Order/Peripherals	318
927	Zykel USA	Modems	315

PCMCIA

378	3 Com Corporation	Etherlink PCMCIA Card	16-17
381/138	H.Co Memory Upgrades	Fax/Modems/Flex/SRAM/Drives	314
921	Kingston Technology	Networking Products	NE3-NE3
940	Silicom Connectivity Solutions	NICs and PCMCIA NICs	NE38
920	US Robotics Inc.	PCMCIA	101

PERIPHERAL SHARING DEVICE

903	Amet	Smartport/Multiport	NE5
865	Rose Electronics	Video Switch & ServeView	NE28

PERIPHERALS

144	CompUSA Direct	Mail Order	232-233
159	COMPUTER DISCOUNT WAREHOUSE	Peripherals	402-405
109	COMPUTER DISCOUNT WAREHOUSE	Peripherals	406-407
380	COMPUTER DISCOUNT WAREHOUSE	Peripherals	408-409
*	DEE ONE SYSTEMS	Peripherals	313
277	Gateway 2000	Peripherals	121-131
219	Global Horizons, Inc.	Peripherals	333
089	Kyocera	Network Printers	NE27
398	Midwest Micro	Peripherals	349-353
*	Network Express	Network Mail Order	340
246	Phillips	Monitors	159
375	Publishers Toolbox	Peripherals	364
051	USA Flex	Peripherals	354-355
210	USA Flex	Peripherals	356-357
211	Xircom	Xircom Token Ring Adapter	258

PLOTTERS/CHARTING DEVICES

*	Pacific Data Products, Inc.	ProTracer	275
---	-----------------------------	-----------	-----

PORTABLE/LAP COMPUTERS

034	Acer America	PCs and Notebooks	81-85
*	AMBRA COMPUTER CORPORATION	rvL Pentium/Notebook SpecSheet	108-114
235	AMS	Notebooks	343
*	AT&T Global Information Solutions	PCs/Notebooks	317-320
012	Austin Computer Systems	Austin Notebooks	286-287
*	Compaq Computer Corporation	Notebooks and Desktops	118-119
137	Compaq Computer Corporation	Centura Aero	278-279
126	CompuAdd	CompuAdd Systems	217
358	CompuAdd	CompuAdd Systems	219
144	CompUSA Direct	Mail Order	232-233
159	COMPUTER DISCOUNT WAREHOUSE	Laptops	402-405
109	COMPUTER DISCOUNT WAREHOUSE	Laptops	406-407
380	COMPUTER DISCOUNT WAREHOUSE	Laptops	408-409
*	Dell Computer Corporation	Dell Systems	CS-C8
*	Dell Computer Corporation	Dell Systems	300-301
305	ExpoTech/VTech	Notebooks	328-331
*	Gateway 2000	Notebooks	121-131
277	Global Horizons, Inc.	Systems/Components	333
*	IBM Corporation	Thinkpad	190-191
*	IBM Corporation	Thinkpad	237
010	Midwest Computer Works	PCs/Hardware	322-323
398	Midwest Micro	Notebooks	349-353
*	Northgate Computer Systems	Notebooks	201
*	Northgate Computer Systems	Notebooks	203
*	Sharp Electronics Corp.	Color Notebooks	287
081	Sunshine Computers	Mail Order	348
353	Texas Instruments	TI Notebooks	94
379	Toshiba America	Notebooks	26-27
051	USA Flex	Notebooks	354-355
210	USA Flex	Notebooks	356-357
036	Zeos Int'l	Zeos Colornote	33
063	Zeos Int'l	Freestyle/Contenda	34-35
038	Zeos Int'l	Ambra	67
115	Zeos Int'l	Pantera	92

POWER PROTECTION

315	American Power Conversion	Matrix	NE7
080	PC Power & Cooling	PowerProtection/Cooling Device	88

PRESENTATION SOFTWARE

*	Microsoft	Powerpoint	96-97
---	-----------	------------	-------

PRINTER ACCESSORIES

128	Avery Dennison	Ink Jet Labels	228
051	USA Flex	Printers	354-355
210	USA Flex	Printers	356-357

PRINTERS

144	CompUSA Direct	Mail Order	232-233
300	Computability	Mail Order	306-307
362	Eastman Kodak Company	Colorless Printer	160-161
*	Epson America	Stylus 800	10-11
118	Hewlett Packard Peripheral Group	HP DeskJet 310	134-135
088	Kyocera	Network Printers	NE27
100	Lexmark International	Writewriter 600	168-169
394	NEC Technologies	Silencerwriter 1087	270
058	Okidata	LED Printers	198-199

Advertisers' Index PRODUCTS

Reader Service

No.	Company	Product	Page
•	Pacific Data Products, Inc.	ProTracer	275
314	Publishing Perfection	Software/Peripherals/Hardware	321
304	Texas Instruments	T1 Printers	187
051	USA Fax	Printers	354-355
210	USA Fax	Printers	356-357

PROJECT MANAGEMENT

146	Primavera Systems	Project Management	60
344	Symantec Corporation	ACT! for Windows	208

REMOTE COMPUTING

070	Funk Software	AppMeter	NE22
346	Norton Lambert	Close-Up	41
053	Olcom USA	Token Ring Adapters	NE29
020	US Robotics Inc.	Total Control Modem Pool	101

RESELLERS

144	CompUSA Direct	Mail Order	232-233
347	DUSTIN DISCOUNT SOFTWARE	Mail Order	304
277	Global Horizons, Inc.	Software	333
018	MegaHouse	Drive/Storage	367
383	Memory Direct	Memory	368
010	Midwest Computer Works	Reseller	322-323
081	Sunshine Computers	Mail Order	348

SCANNERS/DIGITIZERS

•	Canon Computer Systems	Canon Scanners	96
•	Hewlett Packard Peripheral Group	HP ScanJet IICX	74-75
091	Microtek	Scanners	183
314	Publishing Perfection	Hardware/Peripherals/Hardware	321

SERVERS

•	IBM Corporation	Net Select	24-25
•	Network Express	Network Mail Order	340

SERVICE/SUPPORT

342	Bell Atlantic	AirBridge	18
•	Intel Corporation	Intel Verified Labs	223-226
001	Novell, Inc.	Personal NetWare	NE15

SOFTWARE

360	Adobe Systems Inc.	Adobe Postscript	180-181
274	CompuServe	On Line Services	337-338
300	Computability	Mail Order	308-307
348	Computer Associates	Simply Accounting	5
347	DUSTIN DISCOUNT SOFTWARE	Mail Order	304
219	INSIGHT DIRECT/HARD DRIVES INT'L	Software	344-347
263	Macola, Inc.	Accounting Software	277
•	Microsoft	Microsoft FaxPro 2.0	2-3
•	Microsoft	Powerpoint	96-97
•	Microsoft	PC Mail	253-255
346	Norton Lambert	Close-Up	41
146	Primavera Systems	Project Management	60
314	Publishing Perfection	Software/Peripherals/Hardware	321
•	WordPerfect Corporation	WordPerfect - InfoCentral	229

SPREADSHEET/TEMPLATES

220	Borland International	QuattroPro for Windows	51
365	Manugistics	Statgraphics Plus for Windows	265

STATISTICAL SOFTWARE

052	Frye Computer Systems	Frye Utilities for Networks	NE10
-----	-----------------------	-----------------------------	------

TIME MANAGEMENT SOFTWARE

003	MicroSystems Software Inc.	CALANDAR	NE44
-----	----------------------------	----------	------

UNIX PRODUCTS

003	Amet	Smartport/Multiport	NE5
-----	------	---------------------	-----

UTILITIES

052	Frye Computer Systems	Frye Utilities for Networks	NE10
346	Norton Lambert	Close-Up	41
004	Quartadect Office Systems	QEMM 7 for Networked PCs	NE11
117	Symantec Corporation	Norton Desktop for Windows	28
004	Touchstone Software	Check It PRO Analyst	80

VIDEO GRAPHICS/BOARDS

220	ATI Technologies Inc.	Graphics ProTurbo	179
300	Computability	Mail Order	306-307
•	DEE ONE SYSTEMS	Video Cards	313
124	Matrox, Inc.	Matrox MGA II	236
325	MediaMagic	Audio Boards & Sound Systems	207

WINDOWS SOFTWARE

360	Adobe Systems Inc.	Adobe Postscript	180-181
025	American Small Business Computers	Design CAD for Windows	365
265	Borland International	Paradox for Windows	6
220	Borland International	QuattroPro for Windows	51
011	Corel Corporation	Draw 3.0 & Draw 4.0	163
309	DCA	Crosstalk for Windows	23
250	Delrina Technology	Win Fax Pro for Networks	55
070	Funk Software	AppMeter	NE22
•	Intel Corporation	ProShare	243-250
•	Lotus Development Corporation	SmartSuite	90-91
365	Manugistics	Statgraphics Plus for Windows	265
•	Microsoft	Microsoft FaxPro 2.0	2-3
•	Microsoft	Microsoft Office	142-143
•	Microsoft	PC Mail	253-255
346	Norton Lambert	Close-Up	41
058	NOTIS Systems, Inc.	Graphical User Interface	273
375	Publishers Toolbox	Windows Products	364
056	Saber Software	Saber LAN Workstation	NE31
117	Symantec Corporation	Norton Desktop for Windows	28
344	Symantec Corporation	ACT! for Windows	208
•	WordPerfect Corporation	WordPerfect 6.0 for Windows	14-15

WORD PROCESSING SOFTWARE/AIDS

•	WordPerfect Corporation	WordPerfect 6.0 for Windows	14-15
---	-------------------------	-----------------------------	-------

WORK GROUP SOFTWARE

003	MicroSystems Software Inc.	CALANDAR	NE44
-----	----------------------------	----------	------

For Additional Categories See MARKETPLACE PRODUCT INDEX page 380.



Coming Up

RISC-Based PCs, Workstations, And Servers

If the many Intel x86-compatible processors have you bewildered, the new wave of high-powered RISC processors may leave you thoroughly confused. Do chips like IBM's PowerPC (jointly developed with Apple and Motorola), Digital's Alpha, HP's PA-RISC, and Sun Microsystems' SPARC deliver on their promise of tremendous performance? What uses are they best for? We take a close look at RISC-based PCs, workstations, and server platforms—and the applications they support.

32-Bit Operating Systems

The question is no longer whether you'll move to a 32-bit operating system, but which one you'll select. To help you choose among today's desktop and application-server offerings for Intel-based PCs, we evaluate seven leading 32-bit operating systems from IBM, Microsoft, NeXT, Novell, SCO, and SunSoft. While all offer multitasking, multithreading, and protected-mode operation, our tests uncover big differences in setup and administration, performance, networking features, availability of native applications, and applications development tools. We also look at each environment's emulation strategy to see how these OSes run your tried-and-true DOS and Windows apps.

Dial-Up Routers

Network managers preparing to set up their first wide-area connections—perhaps between sites across town—face a myriad of choices. Should your router support dialing on demand? Should it include a modem? Will a standard telephone line do the job, or should you look toward a Switched 56, ISDN, or some other leased-line solution? We examine nine router solutions intended to make your first WAN connection easier.

Power Programming

In a perfect programming world, all of an operating system's useful interfaces and behaviors would be documented, and programmers could treat operating system components like a black box. Unlike Unix program developers, those who program for the Windows family of operating systems—Windows 3.1, NT, Chicago, and Cairo—don't have access to the source code. When faced with a lack of documentation and support resources, they may have to take matters into their own hands and reverse-engineer the relevant code. Join us as *Windows Internals* author Matt Pietrek gets under the covers to show you how to solve the trickiest programming problems.

Editorial Product Index

Reader Service No.	Product	Company	Page
406	Adaptec EZ-SCSI, Version 3.0	Adaptec Inc.	62
429	Aldus IntelliDraw 2.0 for Windows	Aldus Corp.	56
487	Aldus PageMaker for Windows, Version 5.0a	Aldus Corp.	182
443	AlmostPerfect: How a Bunch of Regular Guys Built WordPerfect Corporation	Prima Publishing	73
444	Arcadia Workplace Companion, Version 1.54	Arcadia Technologies Inc.	216
445	Ascend, Version 4.0	Franklin Quest Co.	218
417	The Baarns Utilities 5.0	Baarns Consulting Group	50
461	Berkeley Breathed's Opus 'n Bill Screen Saver	Delrina Corp.	416
418	Braincel, Version 2.0	Promised Land Technologies Inc.	50
952	Catalyst	Cisco Systems Inc.	NE35
963	Cayman GatorStar iHR	Cayman Systems Inc.	NE32
473	CD-Gen for DOS	CD-ROM Strategies Inc.	146
952	Cisco 7010	Cisco Systems Inc.	NE35
441	Cloaking Developer's Toolkit, Version 1.01	Helix Software Co.	269
446	Commence, Version 2.1	Jensen-Jones Inc.	222
431	Compaq Contura Aero 4/25	Compaq Computer Corp.	42
415	CompuServe Navigator, Windows Version 1.0	CompuServe Inc.	54
447	Computer Organizer for Windows, Version 3.04	Impulse Software Inc.	227
489	CompuWorks Publisher for Windows	Wizardworks Inc.	197
413	Copernicus	New Paradigm Software Corp.	68
485	Corel Ventura, Version 4.2	Corel Corp.	177
422	CoSession for Windows	Triton Technologies Inc.	48
424	CrossTies for Windows	CrossTies Software Corp.	37
407	The Debt Analyzer for Windows	Insight Software Solutions	62
423	Dell Latitude 433C+	Dell Computer Corp.	46
426	Desktop Projector 2800	Proxima Corp.	37
448	DeskTop Set for Windows, Version 4.0c	Okna Corp.	228
434	Doc-To-Help 1.6	WexTech Systems Inc.	62
409	Drag and File	Canyon Software	66
449	ECCO Professional, Version 1.0	Arabesque Software Inc.	230
956	EtherChannel	Kalpana Inc.	NE35
464	The Family Doctor, 3rd Edition	Creative Multimedia Corp.	417
462	Feature Presentations: Flight	Colorado Spectrum	418
486	FrameMaker for Windows, Version 4.0	Frame Technology Corp.	181
421	Golden ComPass 2.1	Creative Systems Programming Corp.	48
954	HP AdvanceStack	Hewlett-Packard Co.	NE38
401	IBM RISC System/6000 N40	IBM Corp.	61
428	ImagePals 2	Ulead Systems Inc.	52
459	Imaginaria	Claris Clear Choice	416
450	Instant Recall for Windows, Version 2.1	Chronologic Corp.	231
433	Intel ProShare Personal Conferencing Video System 200	Intel Corp.	40
955	Intellecte	Interleaf Inc.	NE36
425	IntelliView DPS-I	IntelliMedia Corp.	37
483	JVC's Personal Archiver	JVC Information Products	155
747	JVC's Personal RomMaker	JVC Information Products	146
427	LANtastic, Version 6.0	Artisoft Inc.	46
962	Lattis System 5000	SynOptics Communications Inc.	NE13
405	Listen for Windows, Version 1.2	Verbex Voice Systems Inc.	61
451	Lotus Organizer, Release 1.1	Lotus Development Corp.	236
460	Marvel Screen Posters	Berkeley Systems Inc.	416
951	Meeting Maker XP	ON Technology Corp.	NE35
452	Merlin, Version 1.0	Merlin Software Development Co.	239
404	Microsoft Access, Version 2.0	Microsoft Corp.	61
490	Microsoft Publisher, Version 2.0	Microsoft Corp.	199
481	Montage Network	Information Management Research Inc.	148
481	Montage Personal	Information Management Research Inc.	148
419	NEC MultiSync 4PG Multimedia Monitor	NEC Technologies, Inc.	47
484	NetScribe 1000	Meridian Data Inc.	155
964	Nokia PC Card	Nokia Mobile Phones Inc.	NE22
430	The Norton Utilities 8.0	Symantec Corp.	44
420	#9GXE64	Number Nine Computer Corp.	47
465	Nyet III	Proline Software	419
453	On Schedule for Windows, Version 1.0b	Odyssey Computing Inc.	241
957	Opti-UPS	Optiquet Inc.	NE38
466	Oxyd Magnum	Dongleware Publishing	419
454	PackRat, Version 5.011	Polaris Software Inc.	242
491	PagePlus for Windows, Version 2.0	Serif Inc.	200
475	Personal Scribe 500 P	Meridian Data Inc.	148
492	PFS: Publisher	SoftKey International Inc.	202
410	The Phoenix Ultimate Communications Suite	Phoenix Technologies Ltd.	66
476	Pinnacle RCD-202	Pinnacle Micro Inc.	150
411	Platinum, Version 4.0	Platinum Software Corp.	66
477	PlayWrite 1000	Microboards Inc.	155
414	The Print Shop Deluxe CD Ensemble	Broderbund Software Inc.	68
408	Professional Write 3.0	Software Publishing Corp.	66
493	Publish It! for Windows, Version 3.1	Timeworks International Inc.	204
488	QuarkXPress for Windows, Version 3.3	Quark Inc.	186
478	QuickTOPIX/Windows	Optical Media International Inc.	160
965	REXXware	Simware Inc.	NE28
958	Saber Enterprise Application Manager	Saber Software Corp.	NE36
455	Sharkware, Version 1.0	CogniTech Corp.	252
463	SimCity 2000	Maxis	419
479	Simpli-CD	Young Minds Inc.	161
959	StarWorks, Version 1.7	Starlight Networks Inc.	NE36
442	Steve Jobs and the NeXT Big Thing	Atheneum	73
435	SummaSketch FX	Summagraphics Corp.	62
956	SwitchBalance	Kalpana Inc.	NE36
953	Synchronize, Version 1.3	CrossWind Technologies Inc.	NE35
458	3DPC	Forte	416
961	Timbuktu for Windows	Farallon Computing Inc.	NE24
456	Time Planner Deluxe, Version 2.0	H.M. Hinsch & Co. Inc.	256
432	Video Compression Sampler, Version 1.01	Doceo Publishing Inc.	42
412	WBS Chart for Project	Jim Spiller & Associates	68
457	WinInfo Pro, Version 2.0	WinWare Inc.	257
403	WinGopher Complete	Notis Systems Inc.	61
402	WinNET Mail and News	Computer Witchcraft Inc.	61
480	WinOnCD	Philips LMS	162
416	WordPerfect 5.1+ for DOS	WordPerfect Corp.	54
416	WordPerfect 6.0b for DOS	WordPerfect Corp.	54
482	Yamaha CDE100	Yamaha Corp. of America	150
960	ZDS Z-Stor	Zenith Data Systems	NE13

NE=Network Edition

To obtain the Network Edition of PC Magazine, call circulation at 1-800-289-0429

After Hours

Windows Screen Savers: 3DPC, Imaginaria, Marvel Screen Posters, Berkeley Breathed's Opus 'n Bill;
CD-ROM Pick Hit: The Family Doctor, 3rd Edition; **Windows Utilities:** Feature Presentations: Flight;
Simulations: SimCity 2000; **Arcade Games:** Nyet III, Oxyd Magnum

WINDOWS SCREEN SAVERS

Giving Your PC a Touch of Panache

BY MELISSA J. PERENSON

Some might argue that a screen saver is an important part of your PC setup, preventing dreaded monitor burn-in. No matter. That's not why anyone uses a screen saver. What you want is to add a hint of personality to your cookie-cutter workspace, and maybe a little fun to your computing life. Whatever your style, one of these four programs is bound to tickle your fancy.

Those who favor the avant-garde should take a look at Forté's eye-catching **3DPC**. This full-motion screen saver consists of nine lively three-dimensional animations that use sophisticated graphics tech-

niques such as ray tracing, texture mapping, solid-model rendering, and video fusion to create surreal landscapes and scenes.

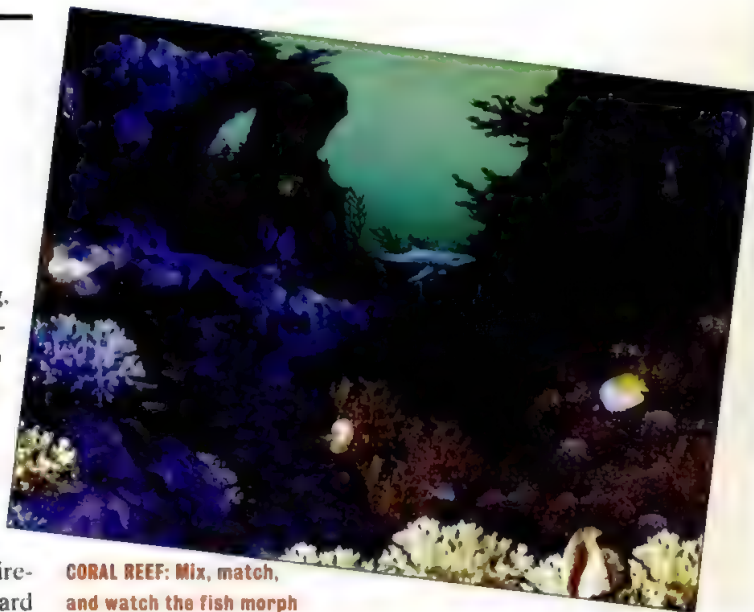
Particularly engrossing are a superbly rendered dragon that swoops across your screen, energetic red

balls that bounce tirelessly in a downward spiral, green droplets that divide with mathematical precision, pigs that fly, and a carousel that rotates endlessly.

Using drag-and-drop thumbnails, you can preview animations easily, as well as customize their play sequence and display duration. All the controls you would expect are here, including play corners, password protection, and the



SPIDER-MAN: Just one of the superheroes in **Marvel Screen Posters**.



CORAL REEF: Mix, match, and watch the fish morph in this tropical animation from **Imaginaria**.

ability to uninstall animations to conserve disk space. Context-sensitive on-line help will guide you through the customization options. Although more add-in packages are planned down the road, at present the greatest drawbacks to **3DPC** are that there are only nine animations and no sound. Fascinating though they may be, eventually you'll find yourself craving more variety.

What **3DPC** lacks in options, **Imaginaria** more than makes up for. This package gives you three types of mod-

ules that you can mix and match to your heart's content: small animated objects (called desktop animations) that float across the active windows of your desktop; full-screen animated screen savers; and transition screens that appear briefly before the start of a screen saver. Selecting the options is as easy as picking one animation from each menu. You can also simply run a screen saver by itself if you prefer.

Unfortunately, an innovative concept alone does not a

FACT FILES

3DPC, \$19.99. Requires: 2MB RAM, 6.5MB hard disk space, Microsoft Windows 3.1, VGA graphics. Forté, 2141 Palomar Airport Rd., #100, Carlsbad, CA 92009-9788; 619-431-6400; fax, 619-431-6497.

Circle 458 on reader service card

Imaginaria, \$49. Requires: 4MB RAM, 3MB hard disk space, Microsoft Windows 3.1. Claris Clear Choice, 5201 Patrick Henry Dr., Santa Clara, CA 95052; 800-325-2747, 408-987-7000; fax, 408-987-7460.

Circle 459 on reader service card

Marvel Screen Posters, \$32.25. Requires: 4MB RAM, 2MB hard disk space, Microsoft Windows 3.x. Berkeley Systems Inc., 2095 Rose St., Berkeley, CA 94709; 510-540-5535; fax, 510-540-5115.

Circle 460 on reader service card

Berkeley Breathed's Opus 'n Bill Screen Saver, 44.95. Requires: 4MB RAM, 4MB hard disk space, Microsoft Windows 3.x. Delrina Corp., 6830 Via Del Oro, #240, San Jose, CA 95119; 800-268-6082, 408-363-2345.

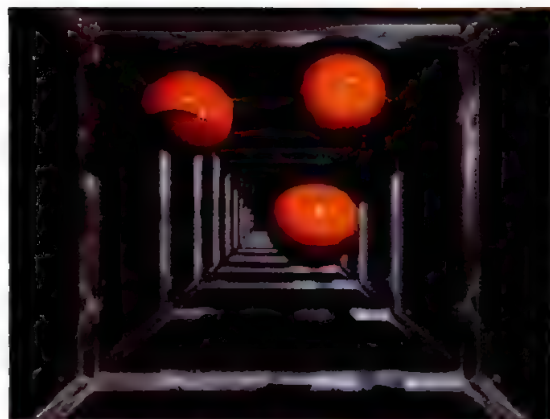
Circle 461 on reader service card

After Hours

great screen saver make. With primitive audio and even more primitive graphics, Imaginaria's sequences plod along clumsily. The desktop animations are a limp bunch, and although there are a couple of redeeming transitions (in particular, the venetian blind effect and morphing), most of them are ineffective. The 15

screen savers offer 1- to 2-minute animation sequences that are crude and stiff, if not an excursion into the surreal. The dancing skeleton in Attic Antics makes for a clever if underdeveloped sequence, while the award for weirdness goes to the sequence featuring business-suited creatures with humanoid bodies and avian or reptilian heads.

Where Imaginaria leans toward the bizarre, **Marvel Screen Posters** traffics in the classics—classic comics, that is. This is the screen saver no comic book enthusiast should be without. Marvel Screen Posters—a standalone module that may be used in tandem



FOLLOW THE BOUNCING BALL: In this 3DPC animation, you can watch the red balls endlessly follow a downward spiral.

with other Berkeley After Dark products—brings the likes of *Captain America*, *Spider-Man*, *The Hulk*, and *Iron Man* to your PC. The 36 screen posters include a mixture of comic book covers (such as the first issue of *Captain America*, from the days when comic books were 10 cents), full comic book pages, and individual comic cels. You can select the display order of the posters and use one of ten special effects as a transition between the still images.

The controls are super, too. You can display captions and additional descriptions of each poster or even zap your favorite superhero into Win-

dows wallpaper, so you need never be lacking for a hero. An on-line manual guides you through the setup and customization options, which include the ability to install or uninstall specific posters. With solid graphics and better-than-expected detail, Marvel Screen Posters is a great addition to the Berkeley screen-saver family.

A marvelously warped sense of humor—alternately twisted, crude, and sarcastic—is the driving force behind **Berkeley Breathed's Opus 'n Bill Screen Saver**. Based on the characters in Breathed's comic strip *Bloom County*, Opus 'n Bill features 16 animation skits, each lasting up to 3 minutes.

The screen saver is as detailed as the comic strip: Watch for the strategically misplaced air bubbles in the Fish Bowl sequence,

Opus's revealing visit to Bill Clinton in the White House, and Bill the Cat's torrid affair with Socks Clinton. In this most recent version, some of the controversy of the original release has been diluted: Opus now takes aim at whirlybird-style flying toasters instead of Berkeley Systems' After Dark flying toasters; the Bill Gates lampoons have been removed, so that now the velociraptor that chases Opus and Bill is a dead ringer for *Jurassic Park* bigwig Steven Spielberg rather than the Microsoft CEO.

Since Opus 'n Bill uses the Intermission 4.0 screen-saver



ATTACK: The velociraptor looks much like Steven Spielberg in this Opus 'n Bill screen saver.

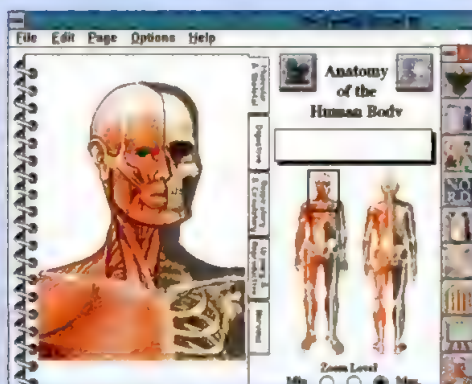
engine, the program may be used with other Intermission or even After Dark screen-saver modules. All the standard controls are here, including the ability to display all the animations in a random sequence or to display only one animation. There's also a \$19.95 subscription available for the quarterly release of additional animation modules. With excellent graphics and audio clips, plus imaginative animations, this is one of the more original and entertaining packages around.

One thing's for certain: Whether you choose one of these screen savers or another of the myriad programs available, your PC will never be dull again.

The Family Doctor Pays Your PC a Call

Hypochondriac's delight or useful medical reference? You make the call. With video, animation, and full-color illustrations, *The Family Doctor*, 3rd Edition, addresses your drug, disease, and first-aid questions. The information on common ailments, ranging from allergies to zoonoses (diseases passed from animals to humans), is detailed and easy to understand, and the unthreatening writing goes a long way toward demystifying even the most bizarre rare diseases. You can use the full-text search capabilities to locate your particular symptoms.

Will this CD replace your doctor? Most definitely not,



but it's cheaper than a house call.—Gayle C. Ehrenman. *The Family Doctor*, 3rd Edition, \$79.99. Creative Multimedia Corp., 503-241-1530.

Circle 464 on reader service card

After Hours

WINDOWS UTILITIES

More than a Screen Saver

BY GAYLE C. EHRENMAN

Armchair pilots who are tired of simulators or just temporarily grounded have something new to send their spirits soaring: **Feature Presentations: Flight.** This Windows entertainment utility packs a wealth of new toys for aircraft enthusiasts looking for ways to personalize their Windows setup.

The program contains five modules: aircraft wallpaper, flight sounds, animated screen savers, Fly-Bys, and an air events calendar. The more than 40 images feature aircraft from a variety of eras, ranging from the Fokker DR 1 Tri-

plane to the F-14 Tomcat. These images can either be turned into standard wallpaper or run as an automated slide show. The 15 digitized

dropping a bomb when you experience a Windows error, or a P-15 takeoff when you launch an application. The screen savers, which range from animated bombers on a mission to sky divers in formation, run as either Windows 3.1 or After Dark screen savers. An events calendar

software will display the appropriate listings. Additional images and updated listings are also available.

While all these features are entertaining enough, the most impressive part of the package is the Fly-By section. This visual guide to vintage and contemporary aircraft provides vital statistics on a wide variety of planes. You select a time period, such as pre- or post-World War II, and an aircraft class, such as bombers or fighters, and up pops a picture and a description. From there the sky's the limit.



AIRBORNE: Fly-Bys offer an incredible amount of aircraft information.

sounds let you attach flight sounds to Windows events, so you can hear a B-25 Mitchell

lists air shows for 1994 in the U.S. and Canada; just select a geographic region, and the

Feature Presentations: Flight, \$39.95. Requires: 2MB RAM, 5MB hard disk space, Microsoft Windows 3.1. Colorado Spectrum, 748 Whalers Way, E-201, Fort Collins, CO 80525; 303-225-6929.

Circle 462 on reader service card

PC MAGAZINE

Network Office NT Advanced NetWare 4.0, and 5 Others Complete

Price Waterhouse And PC Late Tackle Accounting Software

\$49.95 Quantum Pro 5.0 Excel at Data Modeling

PCs with Everything

Fast CD-ROMs • Hard Disks • Fast Video

PLUS

- Built-in CD-ROM
- Sound
- Speakers

ONE YEAR

22 issues for \$29.97.
YOU SAVE 54%!

TWO YEARS

44 issues for \$49.97.
YOU SAVE 62%!

Call toll-free today:
1-800-289-0429

INSIDER'S PRICE

FOR OUR READERS — SUBSCRIBE & SAVE

Plus a Bonus!
3 Disks with 146
utilities FREE with
your paid order.



ANNUAL COVER PRICE	REGULAR SUBSCRIPTION PRICE	YOUR PROFESSIONAL RATE	BONUS STATUS
\$64.98	\$44.97	\$29.97	3 FREE DISKS

Subscribe now, and get 22 issues for only \$29.97 — that's 54% off the annual cover price! Better yet, sign up for two years and get 44 issues for just \$49.97 — a savings of 62%!

Along with your order you'll also get PC Magazine's "Utilities Library" on 3 disks — **FREE** with your paid subscription! These 146 DOS and Windows™ utilities, selected especially for new subscribers by PC Magazine's editors, let you upgrade your system, boost your PC power, and simplify tasks — all at the touch of a key! This exclusive software is available only to new subscribers!

Canada and foreign add \$36.00 per year. U.S. funds only. Canadian GST included. Please allow 30 days for shipment of first issue. FREE disks will be sent upon payment.

SIMULATORS

Bright Lights, SimCity

BY PETER SCISCO

Ihere are a million stories in the naked city. SimCity 2000 lets you tell your own. As a high-powered politico in city hall, you answer only to yourself—and to the people, the budget, the press, business interests, and nature. You get the picture.

SimCity 2000 performs an ambitious and successful

urban renewal project on its popular predecessor, the critically acclaimed SimCity. A three-dimensional perspective replaces the old top-down view. Players can rotate the city map and zoom in or out at three different levels, setting their own zone sizes for light and dense residential, commercial, or industrial development. In addition, the game's terrain builder/editor is more exacting and realistic



UPDATED: A whole new city, with all new problems.

than in the previous version, giving players more design flexibility.

It's tough to turn away from a city once you get it

started. All you need is power, people, and a way to get one to the other. SimCity 2000 is far from simple, however. Disasters can strike at any moment, testing your skills as a city manager. You can skip on

emergency services like fire fighters and police officers, but don't complain if a blaze reduces your sparkling city of the future to nothing but a smoking hole. As the mayor, you can follow these events, as well as your progress, through the newspapers and through the graphs and charts that record the pulse of the city. All of this information is both entertaining and informative.

If you don't want to build your own city, you can start with one of SimCity's five scenarios, which are designed to test your skill as a city manager. Each scenario sets out a problem you have to solve, ranging from unemployment in the Rust Belt to the infamous Oakland Hills Fire of 1991. Your success will depend on how effectively you eliminate the problem and restore the city to health.

SimCity 2000 brings greater depth and realism to the model that made SimCity an instant classic. It makes a trip on the A-train to the bright lights of your hard disk worth the journey.

SimCity 2000, \$69.95. Requires: 4MB RAM, DOS 3.3 or later, VGA display. Maxis, 2 Theatre Sq., Orinda, CA 94563; 800-336-2947, 510-254-9700; fax, 510-253-3736.

Circle 463 on reader service card

SPOTLIGHT ON ARCADE GAMES

A Test for Your Coordination

"Easy to play, hard to win" could be the motto of these DOS-based variations on old strategy/arcade favorites. No elaborate rules here: Just think furiously and respond quickly if you want to stay alive.

Nyet III is Tetris with an attitude. It has screens where falling blocks crack and vanish, grow new squares, or change shapes as they drop. Electromagnetic radiation sometimes pulls a row of blocks one square to the right. There are 18 screens in all, each with its own particular villainous twist.

The challenges are enormous, but the rewards for success are correspondingly great. You receive gold pieces for completing screens or special tasks (brief but difficult challenges). You use the gold to purchase weapons, ranging from inexpensive cameras that freeze the on-screen action to nuclear bombs that clear most of the playing field. Nyet III may be nerve-racking, but it has considerable charm.

In **Oxyd Magnum**, your goal is more modest. Click on the closed oxyd boxes in each landscape so that their colors are revealed in successive pairs. Nothing could be simpler. Did we mention that there are 200

landscapes, each with its own rules and objects? Traversing these multiscreen playing fields is like taking a stroll through deceptively similar but alternate universes. The marble you manipulate in playing the game may bounce off the screen borders in one, plummet to destruction in another, and move onto entirely new, unexplored territory in a third.

The animation is remarkably fluid, and the sound effects are excellent. For the thinking person's arcade game, look to **Oxyd Magnum**.

—Barry Brenesal



MATCH IT: Oxyd Magnum may look easy, but beware.

Nyet III, \$35. Requires: 530K RAM, 1.8MB hard disk space, DOS 3.3 or later. Proline Software, distributed by Pearl America, 4128½ California Ave. SW,

Seattle, WA 98116; 206-938-0336.

Circle 465 on reader service card

Oxyd Magnum, \$59.95. Requires: 2MB RAM, 800K hard disk space, DOS 5.0 or later, mouse. Dongleware Publishing, P.O. Box 391829, Cambridge, MA 02139; 617-497-1130.

Circle 466 on reader service card

Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott



Hut, Hut, Click!

\$49.95 gets you Impulse Software's Official Sports Mouse. Also available in baseball, golf ball, and soccer ball styles (800-460-2848).

Take the CorelDRAW Celebrity Clip-Art Challenge!

Among CorelDRAW's huge clip-art collection are hundreds of celebrity faces. Some are dead ringers, but others... well, can you guess who these eight people are?



Answers to CorelDRAW quiz: (1) Mikhail Baryshnikov. (2) Dana Carvey. (3) Kevin Costner. (4) Sally Field. (5) George Hamilton. (6) Janet Jackson. (7) Demi Moore. (8) Sting.

If your entry is used, we'll send you \$50 and a PC Magazine T-shirt. Send your entries to Abort, Retry, Fail?, PC Magazine, One Park Ave., New York, NY 10016-5802. Winners this issue: Don Lesser, Bill Rogers, and John Ruff.

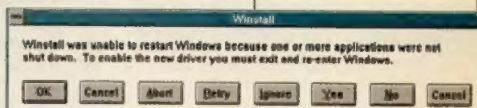
THE ULTRA SLIME NOTEBOOK



Why proofreaders matter. (Serttech Enterprise Co. ad.)

Decisions, Decisions

Faithful reader Don Lesser tried to change a video driver with Windows for Workgroups. Something bad happened, and here's the dialog box he got. Which button would you choose?



Green Computing News

"The second monitor, the one upon which we based this review, looked like a completely different unit. The blacks, even when the monitor was off, were richer, the whites were whiter..."

—WINDOWS MAGAZINE

NEW 486 NOTEBOOK



DUAL-SCAN COLOR

DELL LATITUDE™
MOBILE COLOR

\$2449*

BUSINESS LEASE: \$91/MO.

DELL BEST BUY

DELL LATITUDE MOBILE
SALES MANAGER

\$2799*

BUSINESS LEASE: \$104/MO.

DELL LATITUDE MOBILE
POWERPACK

\$2999*

BUSINESS LEASE: \$111/MO.

BUILT-IN TRACKBALL

- 4MB RAM
 - 170MB HARD DRIVE
- ORDER CODE #5000699

- 4MB RAM
 - 170MB HARD DRIVE
 - ACT1 - CONTACT MANAGER
 - MICROSOFT POWERPOINT
 - MICROSOFT WORKS
 - 24/96 FAX MODEM
 - ATTACHE CARRYING CASE
- ORDER CODE #5000700

- 8MB RAM
 - 170MB HARD DRIVE
 - 14.4 FAX MODEM
 - EXTRA BATTERY
 - ATTACHE CARRYING CASE
- ORDER CODE #5000701

LONG-LIFE BATTERY

FEATURES COMMON TO THESE CONFIGURATIONS:

- 9.5" DUAL-SCAN STN COLOR DISPLAY
- INTEL® i486™ SX SLENNHANCED 33MHz PROCESSOR
- LOCAL BUS VIDEO WITH 512K VRAM
- TYPE II/III PCMCIA EXPANSION SLOT
- 3.5" DISKETTE DRIVE
- NiMH BATTERY
- MS-DOS 6.2/WINDOWS 3.1
- DIMENSIONS: 8.6" x 11.7" x 1.7"
- WEIGHT: 6.4 LBS.
- COMMWORKS [5 COMMUNICATION TOOLS IN 1 PACKAGE]
- AMERICA ONLINE



If you happen to find a notebook that can do more for less, and has dedicated notebook support, kick your heels together. And then buy it.

DELL™

CALL **800-926-4744** NOW

HOURS: MON-FRI 7AM-9PM CT SAT 10AM-6PM CT SUN 12PM-5PM CT
IN CANADA* CALL 800-668-3021 MEXICO* 228-7811 KEYCODE #11BLP

NEW 90MHz PENTIUM



**DOUBLE-SPIN
CD ROM**

DELL DIMENSION™ XPS P90
PENTIUM™ 90MHz SYSTEM†

\$2999*

BUSINESS LEASE*: \$111/MO.

**PCI
LOCAL BUS VIDEO**

- 8MB RAM
- 128MB MAX RAM
- 450MB HARD DRIVE
- 256KB EXTERNAL CACHE
- 7 EXPANSION SLOTS TOTAL (4 ISA, 1 PCI, 1 PCI/ISA SHARED AVAILABLE)
- PCI VIDEO CARD

**256KB V
C**

- VS15 MONITOR
- ONE DISKETTE DRIVE
- SPACESAVER KEYBOARD
- DOUBLE-SPIN CD ROM
- MS-DOS® 6.2/MICROSOFT® 3.1/MOUSE

ORDER CODE #50001

**PC
MAGAZINE**

L
I
B
R
A
R
Y



You could blow a gasket waiting on your old PC, so call now and order a Pentium system that's a total speed demon.

NETWORK
EDITION

DELL™

CALL **800-289-1260** NOW

HOURS: MON-FRI 7AM-9PM CT SAT 10AM-6PM CT SUN 12PM-5PM CT
IN CANADA* CALL 800-668-3021. KEYCODE #11BLN

*This device has not been approved by the Federal Communications Commission. This device is not, and may not be, offered for sale or lease or sold or leased until the approval of the FCC has been obtained.